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Piper

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DEPARTMENT OF ECOLOGY

June 19, 1996

TO: Dan Silver

FROM: Bruce A. Cochran
Toxics Cleanup Program

SUBJECT: Summary Approach for Asarco's Request for TI Waiver

1) Asarco has requested a Technical Impracticability waiver of certain State ARARs. (See Cochran to Dan Silver of 5/6/96 for details)

2) EPA has informally advised Asarco that the information presented does not support a TI waiver. (Ecology has stayed in the wings in these discussions to allow EPA and Asarco as much opportunity as possible to come to an agreement. EPA did provide Asarco with our comment letter on the original document which suggested using a decision process which started with doing all we have agreed to do, then seeing what we had to deal with. See decision tree attached)

3) Asarco says they will present new data. Aldrich (Asarco) to Peterson Lee (EPA) of 5/21/96. "..... Postponing a decision regarding the outstanding surface water issues until Remedial Design or later is unacceptable."

4) EPA is waiting on this new input before deciding/replying. We have not yet seen any new material, but expect it by Friday, 6/21. Cochran will have an opportunity to comment on the/any new material and will reenforce the state position in those comments.

5) The Consent Decree, which contains the dispute resolution process for this issue, is expected to be lodged with the court this week. The notice in the Federal Register is expected from 7 to 10 days later. The notice starts a 30 day public comment period on the consent decree.

6) Cochran and Barnett expect to comment on the Consent Decree that the waiver of ARARs is a public process under CERCLA, and the dispute resolution process in the consent decree appears to circumvent that requirement.

7) EPA will likely deny a TI waiver. (And work toward a "substantial and disproportionate" approach for a different "action level" for the surface waters. This is acceptable to Ecology.)

8) If Asarco appeals to Randy Smith (or Chuck Clark) under the dispute resolution process, Dan Silver will send a letter to Smith/Clark which discusses the good EPA/State relationships, and outlines our objections to the waiver of ARARs. We will emphasize that as long as residual risks exist from residual contaminants, that Asarco must remain a party to the management of those risks. We cannot allow Asarco to "walk away."

9) Smith/Clark will likely deny the TI waiver.

10) If Asarco appeals to the court, Ecology will request an opportunity to address the issues. By having commented to the court on the Consent Decree we will have (hopefully) established the need for a public process. EPA believes any changes made, even for establishing "action levels", will require a public process. (ROD amendment or Explanation of Significant Difference).

cc:

Tanya Barnett	AAG
Tim Nord	
Martha Maggi	
Russ Darr	
Chris Hempleman	
Ed O'Brien	WQ
Mike Herold	WQ

SF 19.3.6.1

ASARCO

Thomas L. Aldrich
Site Manager
Tacoma Plant

June 21, 1996

Ms. Piper L. Peterson Lee
U.S. EPA, Region X
1200 Sixth Avenue, ECL-113
Seattle, WA 98101

Re: Alternate Standard for Tacoma Smelter Surface Water

Dear Ms. Peterson Lee:

I am writing on behalf of Asarco to request a waiver of the surface water quality standard for arsenic adopted in the Tacoma Smelter ROD as an ARAR, or, in the alternative, to request that an alternate standard be selected by EPA. There are several bases for establishing that a waiver or alternate standard is appropriate under the conditions at the Smelter, two of which are discussed below.

First, CERCLA § 121(d) addresses the degree of cleanup to be attained in selecting a remedial action. CERCLA § 121(d)(2)(B)(i) provides a standard for determining whether or not any water quality criteria under the Clean Water Act is relevant and appropriate under the circumstances of the release or threatened release. (Attachment 1) In making this determination, the Agency:

> . . . shall consider the designated or potential use of the surface or groundwater, the environmental media affected, the purposes for which such criteria were developed, and the latest information available.

In addition to the above, the National Contingency Plan (NCP), 40 CFR Part 300, establishes the regulatory framework for complying with CERCLA. 40 CFR § 300.430 addresses the remedial investigation/feasibility study and remedy selection issues. (Attachment 2) In selecting a remedy, overall protection of human health and the environment, and compliance with ARARs are threshold criteria. However, an alternative that does not meet an ARAR under federal or state environmental laws may be selected under certain

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circumstances. 40 CFR § 300.430(f)(1)(ii)(C). Such circumstances include, among others:

> (3) Compliance with the requirement is technically impracticable from an engineering perspective;
>
> (5) With respect to a state requirement, the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances at other remedial actions within the state.

In a separate document submitted to EPA, Asarco's contractor, Hydrometrics, is addressing the technical impracticability from an engineering perspective of meeting the surface water quality standards for metals established in the ROD. See Tacoma Smelter Post-Remediation Surface Water Evaluation and Technical Impracticability Demonstration (March 1996, and supplements thereto). This letter addresses only the arsenic standard.

The purpose of this letter is to demonstrate that, under CERCLA § 121, the water quality standard for arsenic (2 μg/l) established by the National Toxics Rule, and adopted as an ARAR in the ROD for the Tacoma Smelter, is not relevant or appropriate, and, further, to demonstrate that under the NCP, with respect to the state's requirement for water quality, the state has not consistently applied its requirement in similar circumstances.

Accompanying this letter are several documents which provide support to the position that EPA should either waive the National Toxics Rule as an ARAR, or adopt an alternative standard that is more reflective of the intent stated in CERCLA for the use of water quality criteria as an ARAR.

A. Under CERCLA § 121, the water quality standard established in the National Toxics Rule for arsenic is not relevant or appropriate, because, among other issues, it fails to consider the latest information available.

As a result of the many uncertainties associated with risk assessment for arsenic, the ambient water quality criterion has been the subject of much deliberation within EPA's Office of Water.

In a document issued in August 1993, EPA's Science Advisory Board addressed EPA's approach to setting and implementing ambient water quality criteria for human health.

> . . . The committee is concerned, however, that some of the approaches being considered for setting AWQC [ambient water quality criteria] by the Agency do not reflect the necessary strategy of emphasizing regulation of contaminants in the medium (or media) where each contaminant is most likely to cause adverse effects. Instead, the Agency approach focuses almost exclusively on point source discharges to water and fails to place the exposures resulting from them in proper perspective. We are concerned that setting AWQC in this manner could result in the expenditure of large sums of money without achieving significant reductions in human exposure and risks. [Review of the Methodology for Developing Ambient Water Quality Criteria for the Protection of Human Health. EPA-SAB-DWC-93-016 (August 1993).

In June 1995, EPA provided information addressing its current position on the human health criterion for arsenic in a letter to the Pennsylvania Department of Environmental Resources (DER). (Attachment 3)

> . . . Given the uncertainties identified in the current risk assessment for arsenic in the drinking water program. . . and the need for additional data, EPA has decided to reevaluate the existing recommended human health criteria for all programs. We have consulted with staff from EPA Headquarters' Office of Science and Technology and have been advised that during the period of reevaluation of arsenic criteria, the use of the current Maximum Contaminant Level (MCL) value of 50 µg/l is EPA's current recommended level as an interim value for protection of human health. EPA would also support a risk based management decision by the State to adopt a more stringent criterion. [Letter to Dr. Hugh Archer, Deputy Secretary for Water Management, Pennsylvania Department of Environmental Resources from Alvin R. Morris, Director, Water Management Division, USEPA, Region III, Philadelphia, PA (June 2, 1995).]

Mr. Morris' letter to Pennsylvania's DER makes reference to a memorandum from Robert Perciasepe, Assistant Administrator for Water, USEPA Headquarters. (Attachment 4) In his memorandum distributed to, among others, Charles C. Clarke, EPA Region X, dated February 6, 1995, Mr. Perciasepe states:

> I appreciate the time and helpful input from you and your staff as I made the difficult decision on how to proceed with the drinking water standard for arsenic.

> As became apparent during our deliberations, there are many issues and uncertainties involved in the regulation of arsenic. Given the potentially very high cost of this rule, I believe it most prudent for the Agency to get as much information as reasonably possible to accurately quantify the health effects and to assess the possible technologies which could be applied to implement the rule. The level of uncertainty in the current risk assessment justifies additional research before we impose the substantial cost from an MCL lower than the current standard of 50 µg/l. The standard to which the Agency is being held for the adequacy of both risk and cost assessments is higher now than in the past. Therefore, I have decided to request a deferral in the November 1995 court ordered proposal date in order to provide time for additional information to be developed.

Recently, Arizona revised its water quality standards. The state retained its human health based water quality standard for the consumption of drinking water at 50 µg/l, but adopted a new human health based surface water quality standard for arsenic based on fish consumption. In 1995, the EPA established a new screening value for arsenic in fish tissue, which concluded that organic arsenic in fish tissue is not a carcinogen when consumed by humans. Since no more than ten percent of arsenic in fish tissue is inorganic arsenic, Arizona's Department of Environmental Quality took this change as a cue to propose raising its arsenic standard from 3.1 µg/l to 1,450 µg/l. (Attachment 5) According to a news brief in the State Environmental Monitor (May 6, 1996), "USEPA's Region IX office is expected to approve the Arizona standard shortly." (Attachment 6)

In 1995, the Montana State Legislature passed a 10^{-3} based arsenic human health standard for the consumption of water and organisms of 18 µg/l. (Attachment 7 at page 6) According to the legislation, the Board of Health and Environmental Sciences shall formulate and adopt standards of water quality that meet the following requirements:

> For carcinogens, the water quality standard for protection of human health must be the value associated with an excess lifetime cancer risk level, assuming continuous lifetime exposure, not to exceed 1×10^{-3} in the case of arsenic and 1×10^{-5} for other carcinogens. However, if a standard established at a risk level of 1×10^{-3} for arsenic or 1×10^{-5} for other carcinogens violates the maximum contaminant level obtained from 40 CFR, Part 141, then the maximum contaminant level must be

adopted as the standard for that carcinogen. [SB 0331, revising the Montana Water Quality Act, Montana Code Ann. § 75-5-301(2)(b).]

In a letter to Mr. Chuck Clarke, Regional Administrator of EPA Region X, dated May 31, 1996, Michele Brown, Commissioner for the Department of Environmental Conservation, State of Alaska, requested that EPA Region X adopt an interim solution for Alaska since the decision on arsenic has not yet been issued from EPA Headquarters. (Attachment 8) In the interim, the state had been holding up decisions affected by the arsenic water quality criteria. The letter states, in part:

> In 1994, EPA's Science Advisory Board questioned the data and research used by EPA to set the human health criteria for arsenic and questioned the scientific validity of the extremely low limits imposed by the Rule. Since then, EPA has acknowledged a need to reevaluate the arsenic criteria and Region III advised Pennsylvania to use the MCL of 50 µg/l as an interim value. The State of Alaska has followed the debate on arsenic with great interest, and had anticipated a decision from EPA Headquarters by November of 1995. We attempted to put arsenic decisions on hold pending EPA's updated position.
>
> . . .The human health criteria for arsenic currently in the National Toxics Rule in scientifically indefensible. It simply does not make sense to continue to impose criteria on Alaska that EPA won't defend and that the Science Advisory Board cannot support.
>
> This is particularly true when it creates a situation where an operator cannot discharge intake water even though no constituents are added to the wastewater. We have reviewed the arsenic criteria adopted by other states and have found that several states have adopted 50 µg/l for human health criteria. Furthermore, we are aware of several states which have human health criteria for arsenic based on the Toxics Rule number and are seeking relief (e.g., Pennsylvania, California). In our view, a logical interim measure would be for Region X to suspend imposition and enforcement of the Toxics Rule criteria for arsenic, pending EPA's final decision on the validity of that number, and use the state-adopted arsenic standards in the interim.

The governing state water quality standards in Alaska are 50 µg/l for fresh water, derived from the drinking water MCL, and 36 µg/l for saltwater, the aquatic life criterion.

B. The state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances.

A review of recent NPDES Permits and Fact Sheets issued by the Washington State Department of Ecology demonstrates that the state has not consistently applied the National Toxics Rule at other sites. 40 CFR § 300.430(f)(1)(ii)(C)(5). Among the findings are the following:

- In its Fact Sheet for Reichhold Chemicals, for discharges to the Blair Waterway, the Department of Ecology stated that "the permitting authority determines that the discharge has no reasonable potential to cause or contribute to violations of any of the water quality criteria for arsenic." This is in spite of the fact that arsenic was found in the groundwater on-site consistently at concentrations well above the applicable human health criterion, and sometimes in excess of both the acute and chronic aquatic life toxicity criteria. In addition, Ecology did not require any receiving water monitoring for arsenic "because the detection limit is not sensitive enough to provide useful information." The Fact Sheet was issued in 1994. (Attachment 9)

- No arsenic limit is called for in the City of Enumclaw's Permit (pg. 10) and Fact Sheet (pg. 43), although they do have a quarterly monitoring requirement for arsenic. (Attachment 10) Projected maximum concentrations for arsenic at the mixing zone boundary were about nine times higher than the human health standard. The Fact Sheet identifies that effluent limitations for arsenic were calculated but are not required for several reasons (Fact Sheet, pp. 15 - 16). The permit is for discharges to the White River and is dated October 1994.

- The NPDES Permit and Fact Sheet for the City of Olympia and its contributing jurisdictions, dated May 7, 1993, was written after the National Toxics Rule was issued. (Attachment 11) However, human health criteria are not addressed in the Permit or the Fact Sheet. The permit does require monitoring for arsenic twice yearly.

- Arsenic limits from its previous permit were removed in the April 1996 NPDES Permit and Fact Sheet for Kalama Chemical, which discharges to the Columbia River. (Attachment 12) Essentially, the permit writer demonstrated that arsenic loading from Kalama Chemical would be trivial compared to the average river load in the Columbia.

- The Matsushita Semiconductor Corporation of America, which discharges to the Puyallup River and to the City of Puyallup's POTW, was issued in April 1994. (Attachment 13) Arsenic in the effluent ranges from 1.2 to 1.6 ppb (Fact Sheet pg. 9). The effluent from the City of Puyallup POTW contains a maximum 2.1 ppb of arsenic (Fact Sheet pg. 21). All human health criteria are totally glossed over in the permit (Fact Sheet pg. 27).

- General Metals of Tacoma discharges to the Hylebos Waterway. In its NPDES Permit and Fact Sheet, dated August 1995, the arsenic limit was removed; in its prior permit, arsenic was limited to .54 ppm daily max and .4 ppm monthly average, based on a treatability study for stormwater runoff. (Attachment 14) In the new permit, the permit writer did not evaluate whether a limit was needed to meet human health criteria. The spreadsheet, on page 22 of the Fact Sheet, simply compares effluent data to the aquatic life acute and chronic saltwater criteria. Data on which the permit was based included measurements of 14 ppb arsenic (Fact Sheet pg. 7) and 30 ppb arsenic (Fact Sheet pg. 6).

- "The episodic nature of stormwater runoff and the long periods of no discharge during dry summer months requires the use of some form of averaging to account for the long exposure durations upon which the human health criteria are based. The application of the criteria directly to a stormwater discharge without factoring in the periods of no discharge is not sensible, given the seventy year exposure duration that the criteria are based on." Fact Sheet page 20 for NPDES Permit for Cascade Pole Company, discharging to the Blair Waterway (January 1993). (Attachment 15) Measured concentrations of arsenic at the logyard are between 578 and 1860 ppb (Fact Sheet pp. 42 - 43).

SUMMARY

According to CERCLA, in making the determination as to whether or not any water quality criteria under the Clean Water Act are relevant and appropriate for a particular remedial action, the Agency shall consider the designated or potential use of the surface water, the environmental media

affected, the purposes for which the criteria were developed, and the latest information available. Asarco has set out above information that is known, and in some cases developed, by EPA. This information supports Asarco's position that surface water runoff from the site should not be required to meet a 2 µg/l standard particularly where, as discussed in the Technical Impracticability document, it is technically impossible to meet that standard.

Moreover, as you can see from the above excerpts, the Department of Ecology has not consistently applied the National Toxics Rule in circumstances similar to those found at the Asarco Tacoma Smelter. Therefore, according to the NCP, EPA may select an alternative standard that does not meet the state environmental standard adopted as an ARAR.

Asarco has provided and supported two bases for the Agency to waive the 2 µg/l remediation goal set out in the ROD, or for the Agency to adopt an alternate standard.

All of the documents cited in this letter have been attached to the letter and are submitted for the administrative record. If you have any questions or need additional information, please feel free to contact me or David Nation.

Very truly yours,

Thomas L. Aldrich by mm

Thomas L. Aldrich
Site Manager

Enclosures

cc: Cara Steiner-Riley
Donald A. Robbins
David K. Nation
Michael R. Thorp
Marcia Newlands

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"(1) The closure of certain Federal facilities is having adverse effects on the economies of local communities by eliminating jobs associated with such facilities, and delay in remediation of environmental contamination of real property at such facilities is preventing transfer and private development of such property.

"(2) Each department, agency, or instrumentality of the United States, in cooperation with local communities, should expeditiously identify real property that offers the greatest opportunity for reuse and redevelopment on each facility under the jurisdiction of the department, agency, or instrumentality where operations are terminating.

"(3) Remedial actions, including remedial investigations and feasibility studies, and corrective actions at such Federal facilities should be expedited in a manner to facilitate environmental protection and the sale or transfer of such excess real property for the purpose of mitigating adverse economic effects on the surrounding community.

"(4) Each department, agency, or instrumentality of the United States, in accordance with applicable law, should make available without delay such excess real property.

"(5) In the case of any real property owned by the United States and transferred to another person, the United States Government should remain responsible for conducting any remedial action or corrective action necessary to protect human health and the environment with respect to any hazardous substance or petroleum product or its derivatives, including aviation fuel and motor oil, that was present on such real property at the time of transfer."

Limited Grandfather Application

Section 120(b) of Pub.L. 99-499 Title I, Oct. 17, 1986, 100 Stat. 1671, provided that: "Section 120 of CERCLA [this section] shall not apply to any response action or remedial action for which a plan is under development by the Department of Energy on the date of enactment of this Act [October 17, 1986] with respect to facilities—

"(1) owned or operated by the United States and subject to the jurisdiction of such Department;

"(2) located in St. Charles and St. Louis counties, Missouri, or the city of St. Louis, Missouri, and

"(3) published in the National Priorities List.

"In preparing such plans, the Secretary of Energy shall consult with the Administrator of the Environmental Protection Agency."

LAW REVIEW COMMENTARIES

Determining cleanup standards for hazardous waste sites. William D. Turkula, 135 Mil.L.Rev. 167 (1992).

LIBRARY REFERENCES

Health and Environment ⇐25.5(5.5).
C.J.S. Health and Environment § 91 et seq.

§ 9621. Cleanup standards [CERCLA § 121]

(a) Selection of remedial action

The President shall select appropriate remedial actions determined to be necessary to be carried out under section 9604 of this title or secured under section 9606 of this title which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response. In evaluating the cost effectiveness of proposed alternative remedial actions, the President shall take into account the total short- and long-term costs of such actions, including the costs of operation and maintenance for the entire period during which such activities will be required.

(b) General rules

(1) Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions, the President shall, at a minimum, take into account:

(A) the long-term uncertainties associated with land disposal;

(B) the goals, objectives, and requirements of the Solid Waste Disposal Act [42 U.S.C.A. § 6901 et seq.];

(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;

(D) short- and long-term potential for adverse health effects from human exposure;

(E) long-term maintenance costs;

(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

The President shall select a remedial action that is protective of human health and the environment, that is cost effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

(2) The President may select an alternative remedial action meeting the objectives of this subsection whether or not such action has been achieved in practice at any other facility or site that has similar characteristics. In making such a selection, the Presi-

dent may take into account the degree of support for such remedial action by parties interested in such site.

(c) Review

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 9604 or 9606 of this title, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

(d) Degree of cleanup

(1) Remedial actions selected under this section or otherwise required or agreed to by the President under this chapter shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant, or contaminant.

(2)(A) With respect to any hazardous substance, pollutant or contaminant that will remain onsite, if—

(i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act [15 U.S.C.A. § 2601 et seq.], the Safe Drinking Water Act [42 U.S.C.A. § 300f et seq.], the Clear Air Act [42 U.S.C.A. § 7401 et seq.], the Clean Water Act [33 U.S.C.A. § 1251 et seq.], the Marine Protection, Research and Sanctuaries Act [33 U.S.C.A. § 1401 et seq.], or the Solid Waste Disposal Act [42 U.S.C.A. § 6901 et seq.]; or

(ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner,

is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 9604 of this title or secured under section 9606 of this title shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act [42 U.S.C.A. § 300f et seq.] and water quality criteria established under section 304 or 303 of the Clean Water Act [33 U.S.C.A. § 1314 or 1313], where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.

(B)(i) In determining whether or not any water quality criteria under the Clean Water Act [33 U.S.C.A. § 1251 et seq.] is relevant and appropriate under the circumstances of the release or threatened release, the President shall consider the designated or potential use of the surface or groundwater, the environmental media affected, the purposes for which such criteria were developed, and the latest information available.

(ii) For the purposes of this section, a process for establishing alternate concentration limits to those otherwise applicable for hazardous constituents in groundwater under subparagraph (A) may not be used to establish applicable standards under this paragraph if the process assumes a point of human exposure beyond the boundary of the facility, as defined at the conclusion of the remedial investigation and feasibility study, except where—

(I) there are known and projected points of entry of such groundwater into surface water; and

(II) on the basis of measurements or projections, there is or will be no statistically significant increase of such constituents from such groundwater in such surface water at the point of entry or at any point where there is reason to believe accumulation of constituents may occur downstream; and

(III) the remedial action includes enforceable measures that will preclude human exposure to the contaminated groundwater at any point between the facility boundary and all known and projected points of entry of such groundwater into surface water,

then the assumed point of human exposure may be at such known and projected points of entry.

(3) The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment or recycling and the specification of which reduction(s) are occurring;

(4) The degree to which the treatment is irreversible;

(5) The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents; and

(6) The degree to which treatment reduces the inherent hazards posed by principal threats at the site.

(E) *Short-term effectiveness.* The short-term impacts of alternatives shall be assessed considering the following:

(1) Short-term risks that might be posed to the community during implementation of an alternative;

(2) Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures;

(3) Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and

(4) Time until protection is achieved.

(F) *Implementability.* The ease or difficulty of implementing the alternatives shall be assessed by considering the following types of factors as appropriate:

(1) Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy.

(2) Administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions);

(3) Availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and availability of prospective technologies.

(G) *Cost.* The types of costs that shall be assessed include the following:

(1) Capital costs, including both direct and indirect costs;

(2) Annual operation and maintenance costs; and

(3) Net present value of capital and O&M costs.

(H) *State acceptance.* Assessment of state concerns may not be completed until comments on the RI/FS are received but may be discussed, to the extent possible, in the proposed plan issued for public comment. The state concerns that shall be assessed include the following:

(1) The state's position and key concerns related to the preferred alternative and other alternatives; and

(2) State comments on ARARs or the proposed use of waivers.

(I) *Community acceptance.* This assessment includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. This assessment may not be completed until comments on the proposed plan are received.

(f) *Selection of remedy*—(1) Remedies selected shall reflect the scope and purpose of the actions being undertaken and how the action relates to long-term, comprehensive response at the site.

(i) The criteria noted in paragraph (e)(9)(iii) of this section are used to select a remedy. These criteria are categorized into three groups.

(A) *Threshold criteria.* Overall protection of human health and the environment and compliance with ARARs (unless a specific ARAR is waived) are threshold requirements that each alternative must meet in order to be eligible for selection.

(B) *Primary balancing criteria.* The five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost.

(C) *Modifying criteria.* State and community acceptance are modifying criteria that shall be considered in remedy selection.

(ii) The selection of a remedial action is a two-step process and shall proceed in accordance with §300.515(e). First, the lead agency, in conjunction with the support agency, identifies a preferred alternative and presents it to the public in a proposed plan, for review and comment. Second, the lead agency shall review the public comments and consult with the state (or support agency) in order to determine if the alternative remains the most appropriate remedial action for the site or site problem. The lead agency, as specified in §300.515(e), makes the final remedy selection decision, which shall be documented in the ROD. Each remedial alternative selected as a Superfund remedy will employ the criteria as indicated in paragraph (f)(1)(i) of this section to make the following determination:

(A) Each remedial action selected shall be protective of human health and the environment.

(B) On-site remedial actions selected in a ROD must attain those ARARs that are identified at the time of ROD signature or provide grounds for invoking a waiver under §300.430(f)(1)(ii)(C).

(1) Requirements that are promulgated or modified after ROD signature must be attained (or waived) only when determined to be applicable or relevant and appropriate and necessary to ensure that the remedy is protective of human health and the environment.

(2) Components of the remedy not described in the ROD must attain (or waive) requirements that are identified as applicable or relevant and appropriate at the time the amendment to the ROD or the explanation of significant difference describing the component is signed.

(C) An alternative that does not meet an ARAR under federal environmental or state environmental or facility siting laws may be selected under the following circumstances:

(1) The alternative is an interim measure and will become part of a total remedial action that will attain the applicable or relevant and appropriate federal or state requirement;

(2) Compliance with the requirement will result in greater risk to human health and the environment than other alternatives;

(3) Compliance with the requirement is technically impracticable from an engineering perspective;

(4) The alternative will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, or limitation through use of another method or approach;

(5) With respect to a state requirement, the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances at other remedial actions within the state; or

(6) For Fund-financed response actions only, an alternative that attains the ARAR will not provide a balance between the need for protection of human health and the environment at the site and the availability of Fund monies to respond to other sites that may present a threat to human health and the environment.

(D) Each remedial action selected shall be cost-effective, provided that it first satisfies the threshold criteria set forth in §300.430(f)(1)(ii)(A) and (B). Cost-effectiveness is determined by evaluating the following three of the five balancing criteria noted in §300.430(f)(1)(i)(B) to determine overall effectiveness: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. A remedy shall be cost-effective if its costs are proportional to its overall effectiveness.

(E) Each remedial action shall utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This requirement shall be fulfilled by selecting the alternative that satisfies paragraph (f)(1)(ii)(A) and (B) of this section and provides the best balance of trade-offs among alternatives in terms of the five primary balancing criteria noted in paragraph (f)(1)(i)(B) of this section. The balancing shall emphasize long-term effectiveness and reduction of toxicity, mobility, or volume through treatment. The balancing shall also consider the preference for treatment

as a principal eleme
against off-site land
treated waste. In ma
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modifying criteria of
and community acce
in paragraph (f)(1)(i)(C
shall also be considered

(2) *The proposed plan.*
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lead agency shall ide
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ments in §300.430(f)(1),
present that alternati
in a proposed plan. The
conjunction with the
and consistent with §
prepare a proposed plan
scribes the remedial a
lyzed by the lead age
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process. The purpose
plan is to supplement
provide the public wit
opportunity to comme
ferred alternative for r
as well as alternative p
sideration, and to partic
lection of remedial acti
a minimum, the propose

(i) Provide a brief su
tion of the remedial alt
ated in the detailed
lished under paragraph
section;

(ii) Identify and provi
of the rationale that su
ferred alternative;

(iii) Provide a summa
mal comments received
port agency; and

(iv) Provide a summa
of any proposed waiver i
paragraph (f)(1)(ii)(C) o
from an ARAR.

(3) *Community relations*
selection of remedy. (i) Th
after preparation of the
and review by the suppor
conduct the following act

(A) Publish a notice
and brief analysis of the
in a major local newspa
circulation;

Charles D.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

June 2, 1995

Dr. Hugh Archer, Ph.D.
Deputy Secretary for Water Management
Department of Environmental Resources
P. O. Box 2063
Harrisburg, PA 17105-2063

Dear Dr. ~~Archer~~ Hugh:

The purpose of this letter is to provide information regarding the United States Environmental Protection Agency's (EPA) current position regarding the human health criterion for arsenic. As you know, EPA was unable to provide an expert witness to defend Pennsylvania's adoption of the human health criterion for water and organism consumption of 0.02 ug/l. We apologize for any impact that this may have had on Pennsylvania's water quality program.

The ambient water quality criterion for arsenic has been the subject of much deliberation within EPA's Office of Water and will be the subject of continuing discussion and research Given the uncertainties identified in the current risk assessment for arsenic in the drinking water program (e.g. see enclosed memorandum from Robert Perciasepe, Assistant Administrator for Water) and the need for additional data, EPA has decided to reevaluate the existing recommended human health criteria for all programs. We have consulted with staff from EPA Headquarters' Office of Science and Technology and have been advised that during the period of reevaluation of the arsenic criteria, the use of the current Maximum Contaminant Level (MCL) value of 50 ug/l is EPA's current recommended level as an interim value for protection of human health. EPA would also support a risk based management decision by the State to adopt a more stringent criterion.

I hope that this clarifies EPA's position. If you would like any additional information, please feel free to contact me

at (215) 597-9410 or have your staff contact Evelyn MacKnight at (215) 597-4491.

Sincerely,

Alvin R. Morris, Director
Water Management Division

Enclosure

cc: Tudor Davies, EPA
Daniel Drawbaugh, PADER

1 Hr Fax
703 416 ...
Attn Johnson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 6 1995

OFFICE OF
WATER

MEMORANDUM

SUBJECT: Arsenic Decision

FROM: Robert Perciasepe
Assistant Administrator

Bob Perciasepe

TO: Addressees

I appreciate the time and helpful input from you and your staffs as I made the difficult decision on how to proceed with the drinking water standard for arsenic.

As became apparent during our deliberations, there are many issues and uncertainties involved in the regulation of arsenic. Given the potentially very high cost of this rule, I believe it most prudent for the Agency to get as much information as reasonably possible to accurately quantify the health effects and to assess the possible technologies which could be applied to implement the rule. The level of uncertainty in the current risk assessment justifies additional research before we impose the substantial costs from an MCL lower than the current standard of 50 µg/l. The standard to which the Agency is being held for the adequacy of both risk and cost assessments is higher now than in the past. Therefore, I have decided to request a deferral in the November 1995 court-ordered proposal date in order to provide time for additional information to be developed.

In drinking water, the principle health effects of arsenic, at levels we are likely to see, are long-term chronic effects. Thus, the risk increases as exposure accrues. I believe the incremental risk resulting from a delay of a couple of years is offset by the benefit of research to reduce the uncertainty of our risk assessments and provide further data on treatment technologies. If insufficient progress has been made on the research front in that timeframe, it would be appropriate to proceed with rulemaking rather than wait for open-ended research results.

My staff will be working with key Agency staff to develop a plan to obtain the information and to develop a new schedule for the rule. Without question, most of the funding for the additional research will need to come from outside the Agency since our own funding limitations preclude substantial Agency investment. I have been assured that outside parties will help fund the necessary work. We will be formalizing those commitments of support.

In the interim, it is important that we recognize that some people have been exposed to high arsenic levels for a long time. I believe it is important that the current standard be enforced to assure that these people are protected from high arsenic levels. I encourage all of you to help communicate the importance of compliance with the existing arsenic standard.

Addressees:

Mary D. Nichols, OAR
Steven A. Herman, OECA
Jean C. Nelson, OGC
David M. Gardiner, OPPE
Lynn R. Goldman, OPPTS
Robert J. Huggett, ORD
Elliott P. Laws, OSWER
John P. DeVillars, Region 1
Jeanne M. Fox, Region 2
Peter H. Kostmayer, Region 3
John Hankinson, Jr., Region 4
Valdas V. Adamkus, Region 5
Jane N. Saginaw, Region 6
Dennis D. Grams, Region 7
William P. Yellowtail, Region 8
Felicia Marcus, Region 9
Charles C. Clarke, Region 10

cc: Regional Water Division Directors
Regional GW and DW Branch Chiefs
Phil Metzger
Mark Luttner
Mahesh Podar
Cynthia Puskar
Cynthia Dougherty
Tudor Davies
Margaret Stasikowski
Peter Cook
Bill Diamond

(This is a re-typed copy by Lincoln Loehr of the attached Feb 6, 1995 memo from Bob Perciasepe, which was difficult to read)

MEMORANDUM

SUBJECT: Arsenic Decision

FROM: Robert Perciasepe
Assistant Administrator

TO: Addressees

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LINCOLN / 59

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

3033 NORTH CENTRAL AVENUE
PHOENIX, AZ 85012

Office of Administrative Counsel &
Rule Development Section FAX:
(602) 207-2251

If you experience any problems with this transmission call (602) 207-2212

Fact Sheet

DATE: 5/30

TO: LINCOLN LOEHR

FAX NUMBER: 206-447-0849

FROM: STEVE PAWLOWSKI

CONTACT PHONE NUMBER: 207-2227

NUMBER OF PAGES (Including cover sheet): 3

MESSAGE: Here's the fact sheet on Arizona's fish consumption criterion for arsenic.

The EPA has established a new human health screening value (SV) for arsenic in fish tissue that considers only the inorganic fraction, rather than total arsenic (USEPA, 1995). This change in how arsenic is considered is due to the probability that organic arsenic is an order of magnitude less toxic and teratogenic than the inorganic form (Marcus and Rispin, 1988). The new SV also does not consider a carcinogenic endpoint in its calculation. This change only applies to the consumption of fish tissue, and not the consumption of water.

For non-carcinogens the EPA recommends that the fish tissue screening values be calculated according to the following equation:

$$SV = (RfD \times BW)/CR$$

where, SV = Screening value (mg/kg; ppm)
RfD = Oral reference dose (mg/kg/d)
BW = Mean body weight of the general population (kg)
CR = Mean daily consumption rate over a 70 year lifetime (kg/d)

For the fish consumption water quality standard ADEQ uses the same equation, but incorporates a bioconcentration factor (BCF) to address the concentration of a toxicant in tissue above that in the water column:

$$SV = (RFD \times BW)/(CR \times BCF)$$

where, BW = 70 kg
CR = 0.0065 kg/d for 70 year lifetime

Currently, ADEQ calculates the FC standard on the basis of its classification for this use as a carcinogen. Because EPA is publishing new information that changes the status for arsenic for the consumption of tissue from carcinogen to non-carcinogen, ADEQ appropriately should change the method of calculation of the fish consumption standard from carcinogen to non-carcinogen. Explicit in the EPA decision is the fact that arsenic in tissue is at least 90% comprised of organic arsenic (USEPA, 1993). This fact coupled with the low assumed consumption rate for fish tissue (6.5 g/D) and the strong probability of non-linear carcinogenic dose response curve, having a low slope at low dose (where most of the dose is methylated) and a high slope at high dose (where methylation capacity is saturated) (USEPA, 1993) favors this change.

Because there is a possibility of some inorganic arsenic in fish tissue, ADEQ proposes to calculate the new FC arsenic standard according to the following equation:

$$SV = ((RFD \times BW)/(CR \times BCF)) \times 0.9$$

The addition of the 0.9 multiplier is a margin of safety/uncertainty factor that allows for the possibility of some inorganic arsenic in fish tissue. However, regardless of the value of the multiplier this change in status for arsenic results in such a high FC standard for arsenic that DWS and FBC standards for arsenic become the driving standard.

Cited Literature:

Marcus, W.L. and A.S. Rispin. 1988. Threshold carcinogenicity using arsenic as an example. In: Advances in Modern Environmental Toxicology, Vol. XV. Risk Assessment and Risk Management of Industrial and Environmental Chemicals, C.R. Cothern, M.A. Mehlman and W.L. Marcus, Ed. Princeton Scientific Publishing Company, Princeton, NJ. p. 133-158.

USEPA, 1993. Draft Drinking Water Criteria Document for Arsenic. Human Risk Assessment Branch.

USEPA, 1995. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories Volume I: Fish Sampling and Analysis. Second Edition. (EPA 823-R-95-007)

volunteers to assist towns in identifying source waters, and relying on state and local efforts to inform interested parties of opportunities to take voluntary steps to protect the sources. USEPA plans to develop the initiative through partnerships with organizations such as the National Association of Counties and the American Water Works Association. The initiative would begin with efforts in three states, which would be used as a model for other state programs. Currently, agency sources say, source water protection initiatives vary from state to state.

At presstime, agency staff were expected to brief USEPA Water Office chief Robert Perciasepe on the details of the plan in early May.

ARIZONA RELAXES WATER STANDARD FOR ARSENIC BASED ON USEPA DATA

Arizona has proposed relaxing its water quality standard for arsenic based on new USEPA data which indicate that, when it accumulates in fish tissue, the toxic substance is a non-carcinogen. The USEPA "screening value" for arsenic may prod other states to follow Arizona's lead, particularly in Western states with naturally high arsenic levels in water.

In 1995, USEPA established a new screening value for arsenic in fish tissue, which concluded that organic arsenic in fish tissue is not a carcinogen when consumed by humans. Arizona's Department of Environmental Quality took this change as a cue to propose raising its arsenic standard from 3.1 milligrams/liter to 1450 mg/liter. This change could allow for water discharge permits in the state with significantly relaxed arsenic limits, source say.

"Arizona has naturally high background levels of arsenic," a USEPA regional source says, and the state's move to raise its arsenic limits could prompt other Western states to follow suit. Modifying the standard "gives relief to our most stringent standard," an Arizona DEQ staffer says, and the change will "help dischargers meet their permit requirements."

USEPA's Region IX office is expected to approve the Arizona standard shortly.

EXXON FILES 'TAKINGS' CHALLENGES TO ALASKA BAN ON VALDEZ

Arguing that a federal law banning the infamous Exxon Valdez oil tanker from Alaskan waters constitutes a regulatory "taking" of its property, Exxon Corp.'s shipping subsidiary, SeaRiver Maritime, has filed lawsuits in Houston and Washington, D.C., arguing the federal law is unconstitutional.

In the lawsuits filed in March, the plaintiffs are seeking to restore the rights of the Exxon Valdez tanker to sail in Alaska waters. The 1990 Oil Pollution Control Act banned the tanker from Alaska after the March 24, 1989, incident in which the 987-foot tanker spilled more than 11 million gallons of crude oil into Prince William Sound after running aground on Bligh Reef.

Exxon's lawsuit comes as the Senate prepares to debate S. 605, the Property Rights Act, which would change the definition of a "taking" to allow property owners denied any economic use of their property under virtually all federal programs to file for compensation. State and local organizations adamantly oppose such a revision to takings law, fearing a huge economic burden as tax revenues are diverted to pay out takings claims, according to a source with American Resource Information Network, a coalition of state, local, environmental, union, and other interests that have banded together to oppose the Senate bill and a comparable bill already passed in the House.

The Exxon Valdez was renamed the Mediterranean Sea and now carries oil from Egypt to other nearby countries, but SeaRiver Maritime cannot make much money, according to the company's vice president, Pete Rupp, because the Jones Act requires American crews, whose higher wages make the vessel's operation uncompetitive. To make the vessel more competitive, the company had applied for a $1 million year subsidy two years ago, but was turned down and decided to go to court to get sailing rights in Alaska.

NEW HAMPSHIRE RCRA INSPECTION STRATEGY SEEKS TO MAXIMIZE RESOURCES

The New Hampshire Department of Environmental Services has launched a risk-based Resource Conservation & Recovery Act inspection targeting program that state agency staff say will help the department protect key water resources while maximizing use of the state's resources.

According to state sources, DES is now focusing its RCRA inspections on companies in wellhead protection areas, with an eye in particular toward those companies that handle chlorinated solvents. In the future, DES staff say, the department is likely to shift its focus toward facilities in key watershed areas, and staff say the department is also considering taking a closer look at facilities that are located near schools.

DES staff say New Hampshire has had to reduce its number of RCRA inspections because of dwindling resources; the targeted RCRA inspection strategy will help ensure that the most significant threats from RCRA facilities are still monitored. In addition, state staff say the department has stepped up its use of "fenceline" inspections, where DES looks quickly at a facility to judge its potential for non-compliance before launching a full inspection. If the facility appears on its face to be in compliance, the department will likely move on to another company. "If it looks good on the outside, we'll move on to the next guy," a DES source says, explaining that these "screening" inspections allow the department to cover more facilities with less resources.

One unique provision of New Hampshire's RCRA inspection strategy, state staff say, is that DES gives local communities reports detailing information gleaned from facility inspections. While not much has come of the reports to date, state sources say, DES hopes that towns can use this information to foster continued compliance. "A town can take a report and run with it," a state source says, "if they see that a facility has a clean bill of health, the town can try to maintain compliance."

SIX STATES DEVELOPING ENVIRONMENTAL TECHNOLOGY APPROVAL SYSTEM

Six states are planning to sign a new agreement in June to develop and exchange data on a dozen environmental technologies in hopes of ultimately developing a joint certification system for new technologies.

AN ACT GENERALLY REVISING THE MONTANA WATER QUALITY ACT; ESTABLISHING WATER QUALITY STANDARDS; REQUIRING THAT TREATMENT STANDARDS BE ECONOMICALLY, ENVIRONMENTALLY, AND TECHNOLOGICALLY FEASIBLE; AMENDING SECTIONS 75-5-103, 75-5-106, 75-5-301, 75-5-302, 75-5-304, 75-5-305, 75-5-401, 75-5-403, 75-5-605, 75-5-614, 75-5-631, 75-5-636, AND 75-6-112, MCA; AND PROVIDING AN IMMEDIATE EFFECTIVE DATE.

WHEREAS, experience with implementation and enforcement of the Montana water quality statutes has revealed deficiencies in the statutes that have led to inefficiency and unfairness in administration and enforcement of the statutes; and

WHEREAS, those deficiencies can be addressed by selective amendment of the statutes.

STATEMENT OF INTENT

A statement of intent is required to provide guidance to the board of health and environmental sciences regarding rulemaking. The legislature confirms the policy of this state, as reflected in 75-5-101. It is concerned that implementation of the water quality laws has in the past been too dependent on assumptions and conjecture springing from experiences and circumstances from other states and has not been sufficiently based on the conditions and needs of our state. The legislature intends that, in promulgating rules under this bill, the board of health and environmental sciences should seriously consider the impact of proposed rules and that the rules should be adopted only on the basis of sound, scientific justification and never on the basis of projections or conjecture. The legislature is specifically concerned that water quality criteria must reflect concentrations that can be reliably measured, or the rules will, as a practical matter, be unenforceable. [Section 1], providing conditions for adoption of standards more stringent than federal standards, is not intended to prohibit the adoption of ground water quality standards.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MONTANA:

Section 1. Standards more stringent than federal standards. (1) In adopting rules to implement this chapter, the board may adopt rules that are more stringent than corresponding draft or final federal regulations, guidelines, or criteria if the board makes written findings, based on sound scientific or technical evidence in the record, which state that rules that are more stringent than corresponding federal regulations, guidelines, or criteria are necessary to protect the public health, beneficial use of water, or the environment of the state.

(2) The board's written findings must be accompanied by a board opinion referring to and evaluating the public health and environmental information and studies contained in the record that forms the basis for the board's conclusion.

Section 2. Site-specific standards of water quality for aquatic life. (1) Notwithstanding any other provisions of this chapter and except as provided in subsection (2), the board, upon application by a permit applicant, permittee, or person potentially liable under any state or federal environmental remediation statute, shall adopt site-specific standards of water quality for aquatic life, both acute and chronic, as the standards of water quality required under 75-5-301(2) and (3). The site-specific standards of water quality must be developed in accordance with the procedures set forth in draft or final federal regulations, guidelines, or criteria.

(2) If the department, based upon its review of an application submitted under subsection (1) and sound scientific, technical, and available site-specific evidence, determines that the development of site-specific criteria in accordance with draft or final federal regulations, guidelines, or criteria would not be protective of beneficial uses, the department, within 90 days of the submission of an application under subsection (1), shall notify the applicant in writing of its determination and of all additional procedures that the applicant is required to comply with in the development of site-specific standards of water quality under this section. If there is a dispute between the department and the applicant as to the additional procedures, the board shall, on the request of the department or the applicant, hear and determine the dispute. The board's decision must be based on sound scientific, technical, and available site-specific evidence.

Section 3. Section 75-5-103, MCA, is amended to read:

"**75-5-103. Definitions.** Unless the context requires otherwise, in this chapter, the following definitions apply:

(1) "Board" means the board of health and environmental sciences provided for in 2-15-2104.

(2) "Contamination" means impairment of the quality of state waters by sewage, industrial wastes, or other wastes, creating a hazard to human health.

(3) "Council" means the water pollution control advisory council provided for in 2-15-2107.

(4) "Degradation" means a change in water quality that lowers the quality of high-quality waters for a parameter. The term does not include those changes in water quality determined to be nonsignificant pursuant to 75-5-301(5)(c).

(5) "Department" means the department of health and environmental sciences provided for in Title 2, chapter 15, part 21.

(6) "Disposal system" means a system for disposing of sewage, industrial, or other wastes and includes sewage systems and treatment works.

(7) "Effluent standard" means a restriction or prohibition on quantities, rates, and concentrations of chemical, physical, biological, and other constituents ~~which~~ that are discharged into state waters.

(8) "Existing uses" means those uses actually attained in state waters on or after July 1, 1971, whether or not those uses are included in the water quality standards.

(9) "High-quality waters" means state waters whose quality for a parameter is better than standards established pursuant to 75-5-301. All waters are high-quality water unless classified by the board within a classification for waters that are not suitable for human consumption or not suitable for growth and propagation of fish and associated aquatic life.

(10) "Industrial waste" means a waste substance from the process of business or industry or from the development of any natural resource, together with any sewage that may be present.

(11) "Interested person" means a person who has submitted oral or written comments on the department's preliminary decision regarding degradation of state waters~~,~~ pursuant to 75-5-303. The term includes a person who has requested authorization to degrade high-quality waters.

(12) "Local department of health" means the staff, including health officers, employed by a county, city, city-county, or district board of health.

(13) "Metal parameters" includes but is not limited to aluminum, antimony, arsenic, beryllium,

barium, cadmium, chromium, copper, fluoride, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, and zinc.

~~(13)~~(14) "Mixing zone" means an area established in a permit or final decision on nondegradation issued by the department where water quality standards may be exceeded, subject to conditions that are imposed by the department and that are consistent with the rules adopted by the board.

~~(14)~~(15) "Other wastes" means garbage, municipal refuse, decayed wood, sawdust, shavings, bark, lime, sand, ashes, offal, night soil, oil, grease, tar, heat, chemicals, dead animals, sediment, wrecked or discarded equipment, radioactive materials, solid waste, and all other substances that may pollute state waters.

~~(15)~~(16) "Owner or operator" means a person who owns, leases, operates, controls, or supervises a point source.

~~(16)~~(17) "Parameter" means a physical, biological, or chemical property of state water when a value of that property affects the quality of the state water.

~~(17)~~(18) "Person" means the state, ~~a~~ political subdivision of the state, institution, firm, corporation, partnership, individual, or other entity and includes persons resident in Canada.

~~(18)~~(19) "Point source" means a discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, or vessel or other floating craft, from which pollutants are or may be discharged.

~~(19)~~(20) "Pollution" means contamination or other alteration of the physical, chemical, or biological properties of state waters which exceeds that permitted by Montana water quality standards, including but not limited to standards relating to change in temperature, taste, color, turbidity, or odor~~,~~ or the discharge, seepage, drainage, infiltration, or flow of liquid, gaseous, solid, radioactive, or other substance into state water ~~which~~ that will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, or welfare, to livestock, or to wild animals, birds, fish, or other wildlife. A discharge, seepage, drainage, infiltration or flow ~~which~~ that is authorized under the pollution discharge permit rules of the board is not pollution under this chapter. Activities conducted under the conditions imposed by the department in short-term authorizations pursuant to 75-5-308 are not considered pollution under this chapter.

~~(20)~~(21) "Sewage" means water-carried waste products from residences, public buildings, institutions, or other buildings, including discharge from human beings or animals, together with ground

water infiltration and surface water present.

~~(21)~~(22) "Sewage system" means a device for collecting or conducting sewage, industrial wastes, or other wastes to an ultimate disposal point.

~~(22)~~(23) "Standard of performance" means a standard adopted by the board for the control of the discharge of pollutants ~~which~~ that reflects the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, ~~where~~ when practicable, a standard permitting no discharge of pollutants.

~~(23)~~(24) (a) "State waters" means a body of water, irrigation system, or drainage system, either surface or underground~~; however, this subsection~~.

(b) The term does not apply to:

(i) ponds or lagoons used solely for treating, transporting, or impounding pollutants; or

(ii) irrigation waters or land application disposal waters ~~where~~ when the waters are used up within the irrigation or land application disposal system and the waters are not returned to ~~any other~~ state waters.

~~(24)~~(25) "Treatment works" means works, including sewage lagoons, installed for treating or holding sewage, industrial wastes, or other wastes.

~~(25)~~(26) "Water quality protection practices" means those activities, prohibitions, maintenance procedures, or other management practices applied to point and nonpoint sources designed to protect, maintain, and improve the quality of state waters. Water quality protection practices include but are not limited to treatment requirements, standards of performance, effluent standards, and operating procedures and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from material storage.

~~(26)~~(27) "Water well" means an excavation that is drilled, cored, bored, washed, driven, dug, jetted, or otherwise constructed and intended for the location, diversion, artificial recharge, or acquisition of ground water."

Section 4. Section 75-5-106, MCA, is amended to read:

"**75-5-106. Interagency cooperation -- enforcement authorization.** (1) The council, board, and department may require the use of records of all state agencies and may seek the assistance of ~~such~~ the agencies. When the department's review of a permit application submitted under another chapter or title is required or requested, the department shall coordinate the review under this chapter with the review

conducted by the agency or unit under the other chapter, following the time schedule for that review. State, county, and municipal officers and employees, including sanitarians and other employees of local departments of health, shall cooperate with the council, board, and department in furthering the purposes of this chapter, so far as is practicable and consistent with their other duties.

(2) The department may authorize a local water quality district established according to the provisions of Title 7, chapter 13, part 45, to enforce the provisions of this chapter and rules adopted under this chapter on a case-by-case basis. If a local water quality district requests the authorization, the local water quality district shall present appropriate documentation to the department that a person is violating permit requirements established by the department or may be causing pollution, as defined in 75-5-103, of state waters or placing or causing to be placed wastes in a location where they are likely to cause pollution of state waters. The board may adopt rules regarding the granting of enforcement authority to local water quality districts."

Section 5. Section 75-5-301, MCA, is amended to read:

"**75-5-301. Classification and standards for state waters.** Consistent with the provisions of ~~75-5-302 through 75-5-307 and~~ 80-15-201 and this chapter, the board shall:

(1) establish ~~and modify~~ the classification of all state waters in accordance with their present and future most beneficial uses, creating an appropriate classification for streams that, due to sporadic flow, do not support an aquatic ecosystem that includes salmonid or nonsalmonid fish;

(2) (a) formulate and adopt standards of water ~~purity and classification of water according to its most beneficial uses, giving consideration to the economics of waste treatment and prevention~~ quality, giving consideration to the economics of waste treatment and prevention.

(b) Standards adopted by the board must meet the following requirements:

(i) for carcinogens, the water quality standard for protection of human health must be the value associated with an excess lifetime cancer risk level, assuming continuous lifetime exposure, not to exceed 1×10^{-3} in the case of arsenic and 1×10^{-5} for other carcinogens. However, if a standard established at a risk level of 1×10^{-3} for arsenic or 1×10^{-5} for other carcinogens violates the maximum contaminant level obtained from 40 CFR, part 141, then the maximum contaminant level must be adopted as the standard for that carcinogen.

(ii) standards for the protection of aquatic life do not apply to ground water~~;~~.

(3) review, from time to time at intervals of not more than 3 years and, to the extent permitted by this chapter, revise established classifications of waters and adopted standards of water ~~purity and classification~~ quality;

(4) adopt rules governing the granting of mixing zones, requiring that mixing zones granted by the department be specifically identified, and requiring that mixing zones have:

(a) the smallest practicable size;

(b) a minimum practicable effect on water uses; and

(c) definable boundaries;

(5) adopt rules implementing the nondegradation policy established in 75-5-303, including but not limited to rules that:

(a) provide a procedure for department review and authorization of degradation;

(b) establish criteria for the following:

(i) determining important economic or social development; and

(ii) weighing the social and economic importance to the public of allowing the proposed project against the cost to society associated with a loss of water quality; ~~and~~

(c) establish criteria for determining whether a proposed activity or class of activities will result in nonsignificant changes in water quality for any parameter in order that those activities are not required to undergo review under 75-5-303(3). These criteria must be established in a manner that generally:

(i) equates significance with the potential for harm to human health or the environment;

(ii) considers both the quantity and the strength of the pollutant;

(iii) considers the length of time the degradation will occur; ~~and~~

(iv) considers the character of the pollutant so that greater significance is associated with carcinogens and toxins that bioaccumulate or biomagnify and lesser significance is associated with substances that are less harmful or less persistent.

(d) provide that changes of nitrate in ground water are nonsignificant if the discharge will not cause degradation of surface water and the predicted concentration of nitrate at the boundary of the ground water mixing zone does not exceed:

(i) 7.5 milligrams per liter for nitrate sources other than domestic sewage;

(ii) 5.0 milligrams per liter for domestic sewage effluent discharged from a conventional septic system;

(iii) 7.5 milligrams per liter for domestic sewage effluent discharged from a septic system using level two treatment, which must be defined in the rules; or

(iv) 7.5 milligrams per liter for domestic sewage effluent discharged from a conventional septic system in areas where the ground water nitrate level exceeds 5.0 milligrams per liter primarily from sources other than human waste.

(6) to the extent practicable, ensure that the rules adopted under subsection (5) establish objective and quantifiable criteria for various parameters. These criteria must, to the extent practicable, constitute guidelines for granting or denying applications for authorization to degrade high-quality waters under the policy established in 75-5-303(2) and (3).

(7) adopt rules to implement this section."

Section 6. Section 75-5-302, MCA, is amended to read:

"**75-5-302. Revised classifications not to lower water quality standards -- exception.** In revising classifications or standards or in adopting new classifications or standards, the board may not so formulate standards of water ~~purity~~ quality or classify ~~any~~ state water as to lower ~~any~~ the water quality standard applicable to ~~any~~ state water below the level applicable under the classifications and standards adopted except upon a finding that a particular state water has been classified under a standard or classification of water quality that is higher than the actual water quality that existed at the time of classification and only if the action is taken pursuant to 75-5-307. When the board or department is presented with facts indicating that a body of water is misclassified, the board shall, within 90 days, initiate rulemaking to correct the misclassification."

Section 7. Section 75-5-304, MCA, is amended to read:

"**75-5-304. Adoption of standards -- pretreatment, effluent, performance.** (1) The board shall:

(a) adopt pretreatment standards for wastewater discharged into a municipal disposal system~~;~~

(b) adopt effluent standards as defined in 75-5-103~~;~~

(c) adopt toxic effluent standards and prohibitions~~;~~ and

(d) establish standards of performance for new point source discharges.

(2) In taking action under subsection (1), the board shall ensure that the standards are cost-effective and economically, environmentally, and technologically feasible."

Section 8. Section 75-5-305, MCA, is amended to read:

"75-5-305. Adoption of requirements for treatment of wastes -- variance procedure -- appeals. (1) The board may establish minimum requirements for the treatment of wastes. For cases in which the federal government has adopted technology-based treatment requirements for a particular industry or activity in 40 CFR, chapter I, subchapter N, the board shall adopt those requirements by reference. To the extent that the federal government has not adopted minimum treatment requirements for a particular industry or activity, the board may do so, through rulemaking, for parameters likely to affect beneficial uses, ensuring that the requirements are cost-effective and economically, environmentally, and technologically feasible. Except for the technology-based treatment requirements set forth in 40 CFR, chapter I, subchapter N, minimum treatment may not be required to address the discharge of a parameter when the discharge is considered nonsignificant under rules adopted pursuant to 75-5-301.

(2) The board shall establish minimum requirements for the control and disposal of sewage from private and public buildings, including standards and procedures for variances from the requirements.

(3) An applicant for a variance from minimum requirements adopted by a local board of health pursuant to 50-2-116(1)(i) may appeal the local board of health's final decision to the department by submitting a written request for a hearing within 30 days after the decision. The written request must describe the activity for which the variance is requested, include copies of all documents submitted to the local board of health in support of the variance, and specify the reasons for the appeal of the local board of health's final decision.

(4) The department shall conduct a hearing on the request pursuant to Title 2, chapter 4, part 6. Within 30 days after the hearing, the department shall grant, conditionally grant, or deny the variance. The department shall base its decision on the board's standards for a variance.

(5) A decision of the department pursuant to subsection (4) is appealable to district court under the provisions of Title 2, chapter 4, part 7."

Section 9. Section 75-5-401, MCA, is amended to read:

"75-5-401. Board rules for permits. (1) The board shall adopt rules:

(a) governing application for permits to discharge sewage, industrial wastes, or other wastes into state waters, including rules requiring the filing of plans and specifications relating to the construction, modification, or operation of disposal systems;

(b) governing the issuance, denial, modification, or revocation of permits. The board may not require a permit for a water conveyance structure or for a natural spring if the water discharged to state waters does not contain industrial waste, sewage, or other wastes. Discharge to surface water of ground water that is not altered from its ambient quality does not constitute a discharge requiring a permit under this part and is not degradation if:

(i) the discharge does not contain industrial waste, sewage, or other wastes;

(ii) the water discharged does not cause the receiving waters to exceed applicable standards for any parameters; and

(iii) to the extent that the receiving waters in their ambient state exceed standards for any parameters, the discharge does not increase the concentration of the parameters.

(2) The rules ~~shall~~ must allow the issuance or continuance of a permit only if the department finds that operation consistent with the limitations of the permit will not result in pollution of any state waters, except that the rules may allow the issuance of a temporary permit under which pollution may result if the department ~~insures~~ ensures that ~~such~~ the permit contains a compliance schedule designed to meet all applicable effluent standards and water quality standards in the shortest reasonable period of time.

(3) The rules shall provide that the department may revoke a permit if the department finds that the holder of the permit has violated its terms, unless the department also finds that the violation was accidental and unforeseeable and that the holder of the permit corrected the condition resulting in the violation as soon as was reasonably possible.

(4) The board may adopt rules governing reclamation of sites disturbed by construction, modification, or operation of disposal systems for which a bond is voluntarily filed by a permittee pursuant to 75-5-405, including rules for the establishment of criteria and procedures governing release of the bond or other surety and release of portions of a bond or other surety."

Section 10. Section 75-5-403, MCA, is amended to read:

"**75-5-403. Denial or modification of permit -- time for review of permit application.** (1) The department shall review for completeness all applications for new permits within 60 days of the receipt of the initial application and within 30 days of receipt of responses to notices of deficiencies. The initial completeness notice must note all major deficiency issues, based on the information submitted. The department and the applicant may extend these timeframes, by mutual agreement, by not more than 75

days. An application is considered complete unless the applicant is notified of a deficiency within the appropriate review period.

(2) If the department denies an application for a permit or modifies a permit, the department shall give written notice of its action to the applicant or holder and ~~he~~ the applicant or holder may request a hearing before the board, in the manner stated in 75-5-611, for the purpose of petitioning the board to reverse or modify the action of the department. ~~Such~~ The hearing ~~shall~~ must be held within 30 days after receipt of written request. After the hearing, the board shall affirm, modify, or reverse the action of the department. If the holder does not request a hearing before the board, modification of a permit ~~shall be~~ is effective 30 days after receipt of notice by the holder unless the department specifies a later date. If the holder does request a hearing before the board, ~~no~~ an order modifying ~~his~~ the permit ~~shall be~~ is not effective until 20 days after ~~he has received~~ receipt of notice of the action of the board.

~~(2) This section does not apply to any modification made in permit conditions at the time of reissuance, but only to those modifications made in existing permits during their terms.~~"

Section 11. Section 75-5-605, MCA, is amended to read:

"**75-5-605. Prohibited activity.** (1) It is unlawful to:

(a) cause pollution as defined in 75-5-103 of any state waters or to place or cause to be placed any wastes where they will ~~in a location where they are likely to~~ cause pollution of any state waters~~;~~. Any placement of materials that is authorized by a permit issued by any state or federal agency is not a placement of wastes within the prohibition of this subsection if the agency's permitting authority includes provisions for review of the placement of materials to ensure that it will not cause pollution of state waters.

(b) violate any provision set forth in a permit or stipulation, including but not limited to limitations and conditions contained in the permit;

(c) site and construct a sewage lagoon less than 500 feet from an existing water well;

(d) cause degradation of state waters without authorization pursuant to 75-5-303;

(e) violate any order issued pursuant to this chapter; or

(f) violate any provision of this chapter.

(2) It is unlawful to carry on any of the following activities without a current permit from the department:

(a) construct, modify, or operate a disposal system ~~which~~ that discharges into any state waters;

(b) construct or use any outlet for the discharge of sewage, industrial wastes, or other wastes into any state waters; or

(c) discharge sewage, industrial wastes, or other wastes into any state waters."

Section 12. Section 75-5-614, MCA, is amended to read:

"**75-5-614. Injunctions authorized.** (1) The department is authorized to commence a civil action seeking appropriate relief, including a permanent or temporary injunction, for a violation ~~which~~ that would be subject to a compliance order under 75-5-613. An action under this subsection may be commenced in the district court of ~~the county in which the defendant is located or resides or is doing business or any~~ the county where a violation occurs or is threatened ~~if the defendant cannot be located in Montana~~, and the court ~~shall have~~ has jurisdiction to restrain the violation and to require compliance.

(2) The department may bring an action for an injunction against the continuation of an alleged violation of the terms or conditions of a permit issued by the department or any rule or effluent standard promulgated under this chapter or against a person who fails to comply with an emergency order issued by the department under 75-5-621 or a final order of the board. The court to which the department applies for an injunction may issue a temporary injunction if it finds that there is reasonable cause to believe that the allegations of the department are true, and it may issue a temporary restraining order pending action on the temporary injunction."

Section 13. Section 75-5-631, MCA, is amended to read:

"**75-5-631. Civil penalties -- injunctions not barred.** (1) A person who violates this chapter or a rule, permit, effluent standard, or order issued under the provisions of this chapter ~~shall be~~ is subject to a civil penalty not to exceed $25,000. Each day of violation constitutes a separate violation.

(2) Action under this section does not bar enforcement of this chapter or of rules or orders issued under it by injunction or other appropriate remedy.

(3) The department shall institute and maintain ~~any~~ enforcement proceedings in the name of the state.

(4) ~~When~~ In an action seeking penalties under this section, the department shall take into account the following factors in determining an appropriate settlement, if any, subsequent to the filing of a

complaint:

(a) the nature, circumstances, extent, and gravity of the violation; and

(b) with respect to the violator, ~~his~~ the violator's ability to pay~~, any~~ and prior history of ~~such~~ violations, the economic benefit or savings, if any, to the violator resulting from the violator's action, amounts voluntarily expended by the violator to address or mitigate the violation or impacts of the violation to waters of the state, and ~~any~~ other matters as justice may require."

Section 14. Section 75-5-636, MCA, is amended to read:

"**75-5-636. Action by other parties.** A person, association, corporation, or agency of the state or federal government may apply to the department protesting a violation of this chapter. The department shall make an investigation and make a written report to the person, association, corporation, or agency ~~which~~ that made the protest. If a violation is established by the investigation of the department, appropriate enforcement action ~~shall~~ must be taken. If the investigation proves the protest to have been without reasonable cause, the department may seek recovery of investigative costs from the person who made the application."

Section 15. Section 75-6-112, MCA, is amended to read:

"**75-6-112. Prohibited acts.** A person may not:

(1) discharge sewage, drainage, industrial waste, or other wastes that will cause pollution of state waters used by a person for domestic use or as a source for a public water supply system or water or ice company;

(2) discharge sewage, drainage, industrial waste, or other waste into any state waters or on the banks of any state waters or into any abandoned or operating water well unless the sewage, drainage, industrial waste, or other waste is treated as prescribed by the board;

(3) build or operate any railroad, logging road, logging camp, or electric or manufacturing plant of any kind on any watershed of a public water supply system unless:

(a) the water supply is protected from pollution by sanitary precautions prescribed by the board; and

(b) a permit has been issued by the department after approval of detailed plans and specifications for sanitary precautions;

(4) commence construction, alteration, or extension of any system of water supply, water distribution, sewer, drainage, wastewater, or sewage disposal before ~~he~~ the person submits to the department necessary maps, plans, and specifications for its review and the department approves those maps, plans, and specifications~~;~~. However, any facility reviewed by the department under Title 75, chapter 5, is not subject to the provisions of this section.

(5) operate or maintain any public water supply system ~~which~~ that exceeds a maximum contaminant level established by the board unless ~~he~~ the person has been granted or has an application pending for a variance or exemption pursuant to this part;

(6) violate any provision of this part or a rule adopted under this part; or

(7) violate any condition or requirement of an approval issued pursuant to this part."

Section 16. Codification instruction. [Sections 1 and 2] are intended to be codified as an integral part of Title 75, chapter 5, part 3, and the provisions of Title 75, chapter 5, part 3, apply to [sections 1 and 2].

Section 17. Saving clause. [This act] does not apply to civil or administrative actions commenced prior to [the effective date of this act] or to claims made in those actions, except that compliance plans resulting from those actions must reflect changes made by [this act].

Section 18. Effective date. [This act] is effective on passage and approval.

-END-

SENATE BILL NO. 331

INTRODUCED BY BECK, FELAND, OHS, ORR, KNOX, BURNETT, ELLIS, HARGROVE, PIPINICH, MENAHAN, SLITER, DEVLIN, GRIMES, BAER, CRISMORE, STOVALL, REHBEIN, TASH, LYNCH, JACOBSON, AKLESTAD, FORRESTER, HARDING, GRADY, COLE, JENKINS, PAVLOVICH, QUILICI, GRINDE, SWYSGOOD, CLARK, HARP, FOSTER, HERTEL, KEATING, EMERSON

AN ACT GENERALLY REVISING THE MONTANA WATER QUALITY ACT; ESTABLISHING WATER QUALITY STANDARDS; REQUIRING THAT TREATMENT STANDARDS BE ECONOMICALLY, ENVIRONMENTALLY, AND TECHNOLOGICALLY FEASIBLE; AMENDING SECTIONS 75-5-103, 75-5-106, 75-5-301, 75-5-302, 75-5-304, 75-5-305, 75-5-401, 75-5-403, 75-5-605, 75-5-614, 75-5-631, 75-5-636, AND 75-6-112, MCA; AND PROVIDING AN IMMEDIATE EFFECTIVE DATE.^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z ^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z ^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z^Z

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TONY KNOWLES, GOVERNOR
410 Willoughby Ave., Ste 105
Juneau, AK 99801-1795
PHONE: (907) 465-5065
FAX: (907) 465-5070
http://www.state.ak.us/dec/home.htm

DEPT. OF ENVIRONMENTAL CONSERVATION
OFFICE OF THE COMMISSIONER

May 31, 1996

Mr. Chuck Clarke
Regional Administrator
EPA Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Clark:

The human health criteria standard for arsenic, as promulgated in the National Toxics Rule, presents an ongoing dilemma for permitting Alaska operations due to the high levels of naturally occuring arsenic in Alaska waters. The governing state water quality standards for arsenic are 50 ug/l for fresh water (derived from the drinking water MCL), and 36 ug/l for salt water (the aquatic life criterion). However, EPA determined in 1992 that the state standard was superseded by the National Toxics Rule, resulting in an arsenic criteria of .18 ug/l. See 40 CFR §131.36. The method detection limit is .5 ug/l.

In 1994, EPA's Science Advisory Board questioned the data and research used by EPA to set the human health criteria for arsenic, and questioned the scientific validity of the extremely low limits imposed by the Rule. Since then, EPA has acknowledged a need to reevaluate the arsenic criteria, and Region III advised Pennsylvania to use the MCL of 50 ug/l as an interim value. The State of Alaska has followed the debate on arsenic with great interest, and had anticipated a decision from EPA Headquarters by November of 1995. We attempted to put arsenic decisions on hold pending EPA's updated position.

I am writing now to request that Region X adopt an interim solution for the State of Alaska, since a decision on arsenic has not been issued from EPA headquarters and we can no longer hold up decisions affected by the arsenic criteria. The human health criteria for arsenic currently in the National Toxics Rule is scientifically indefensible. It simply does not make sense to continue to impose criteria on Alaska that EPA won't defend, and that the Science Advisory Board cannot support.

This is particularly true when it creates a situation where an operator cannot discharge intake water even though no constituents are added to the wastewater. We have reviewed the arsenic criteria adopted by other states and have found that several states have adopted 50 ug/l for human health criteria. Furthermore, we are aware of several states which have human health criteria for arsenic based on the Toxics Rule number and are seeking relief (e.g. Pennsylvania, California). In our view, a logical interim measure would be for Region X to suspend imposition and enforcement of

the Toxics Rule criteria for arsenic, pending EPA's final decision on the validity of that number, and use the state-adopted arsenic standards in the interim. These numbers are currently used in state permitting decisions involving arsenic, and are defensible.

We are preparing a fact sheet on arsenic which will describe in more detail the basis for recommending that the current State-adopted standards for arsenic apply during the interim. I know that you are familiar with the problem, and I trust that we can expeditiously resolve this issue. I will call you to set up a teleconference to discuss this further.

Sincerely,

Michele Brown
Commissioner

SB/MB/sl (G:\COMMS\WORDPROC\ARS-FIN.WPD)

cc: Phil Millam, Acting Director, Office of Water, Seattle
Len Verrelli, AWQ Director, ADEC, Juneau

1994

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DRAFT

Effective Date: _____
Expiration Date: _____

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

Reichhold Chemicals, Incorporated
3320 Lincoln Avenue
Tacoma, WA 98421

Location:

3320 Lincoln Avenue
Tacoma, Washington

Discharges:

Groundwater Remediation
Storm Water

Water Body I.D. No.:

WA-10-0020

Receiving Waters:

Blair Waterway, Commencement Bay
Lincoln Avenue Ditch

Discharge Coordinates:

Outfall No. RC-1
47° 15' 38" N
122° 22' 59" W

Outfall No. RC-2
47° 16' 08" N
122° 23' 42" W

---

is authorized to discharge in accordance with
the special and general conditions which follow.

William H. Backous, P.E.
Section Supervisor Water Quality Program
Southwest Regional Office

FACT SHEET
AND
STATEMENT OF BASIS
FOR DRAFT PERMIT

Permit Type:	National Pollutant Discharge Elimination System (NPDES)
Permit Number:	WA-004077-1
Permit Applicant:	Reichhold Chemical, Inc. 3320 Lincoln Avenue Tacoma, WA 98421
Permitting Authority:	Department of Ecology Southwest Regional Office P.O. Box 47775 Olympia, WA 98504
Permit Writer:	Norman K. Schenck, P.E.

The permitting authority has made a tentative decision to issue a new discharge permit with respect to application by the above-named applicant for the discharge of pollutants to surface waters. Authority is given to the Department of Ecology to issue NPDES permits, along with the obligation to specify in them "conditions necessary to prevent and control waste discharges into waters of the state." Ecology must issue a permit unless it finds that the discharge as proposed in the application will pollute the waters of the state in violation of the public policy declared in RCW 90.48.010.

The purpose of this document is to present the facts on the basis of which a decision to issue the permit was made, and to explain the basis for the permit limits and conditions. The fact sheet is intended to accompany the draft permit.

Interested persons are invited to comment on this tentative decision. A 30-day period for receiving comments on the draft permit begins on February 4 and ends on March 6, 1994. All written comments submitted during the comment period will be retained by the permitting authority and considered in making the final decision on the application for a permit. The permitting authority will provide copies of the application, the draft permit and the fact sheet on request. Persons who submit written comments will be notified of the final decision.

The applicant or anyone affected by or interested in the decision may request a public hearing. The request must be filed within the 30-day comment period, and must indicate the interest of the party filing such a request and the reasons why a hearing is warranted. The permitting authority will hold a public hearing if it determines there is sufficient public interest.

Please submit written comments to the permitting authority at the above address, to the attention of Holly Francis, Permit Coordinator.

and provision is made to reopen the permit to modify it if necessary, based on this information (Special Condition S7).

Arsenic:

During the RCRA ground water investigations arsenic was found in the ground water consistently at concentrations well above the applicable human health criterion (organism ingestion) and sometimes exceeded both acute and chronic aquatic life toxicity criteria. There is no obvious source of arsenic indicated by historic production activities on the site. Arsenic was not detected in the treatment system effluent sampling, but the detection limit was as high as 8 μg/L. This is below the aquatic life criteria of 69 and 36, but 57 times the human health criterion of 0.14 μg/L. Still, even within the relatively small zone where chronic aquatic life toxicity criteria are by regulation allowed to be exceeded, the calculated minimum dilution would reduce the concentration by 200 times. Assuming arsenic in the discharge at the detection limit of 8 μg/L and no significant arsenic in the diluting water, the human health criterion would be met even within this zone. The effective "dilution factor" which would reflect the average exposure concentration to the most pertinent food organisms in the receiving water would likely be much greater. On this basis the permitting authority determines that the discharge has no reasonable potential to cause or contribute to violations of any of the water quality criteria for arsenic. A technology-based limit is established in the draft permit based on the demonstrated performance of the treatment system. (No receiving water monitoring for arsenic is required because the detection limit is not sensitive enough to provide useful information.)

Barium:

Barium was mistakenly placed on the list of pollutants of concern. It was found to exceed a water quality criterion (by three times) in one of many samples of ground water. However, the only water quality criterion for barium is for drinking water, which is not relevant to this saltwater discharge in any case. Hence the draft permit contains no effluent limitations nor monitoring requirements for barium.

Copper, Nickel and Cyanide:

Copper, nickel, and cyanide are reported in the application as present, but solely because of their presence in the intake water. That is, they are not there because of activities on the site, but rather because they are ubiquitous in the ground water of that region. Whether the source is natural or man-made is not clear, but the implication of the requirements for application (no quantitative measurements are required) is that the applicant is not required to remove what is already present in its "intake" water, i.e., what it did not add. This seems reasonable in this case, since the ground water is hydrologically connected to the adjacent surface water anyway, so they are constantly exchanging constituents, uncontrolled, where they interface. To reduce levels in this relatively insignificant controlled discharge would be futile in terms of making a difference in the receiving water.

Lead:

Lead is on the list because it was found in the ground water at concentrations ranging from 2 to 350 μg/L, and because the applicant requested to discharge it at 110 μg/L (max.). A possible source of lead from activities at the site is lead naphthanate which was a chemical involved in the production of

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DRAFT

Issuance Date: _____
Effective Date: _____
Expiration Date: _____

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-7775

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

City of Enumclaw
1309 Myrtle Avenue
Enumclaw, WA 98022

Plant Location:

451 Semanski Street South
Enumclaw, King County, Washington

Receiving Water:

White River at Enumclaw, River mile 23.1

Water Body I.D. No.:

WA-10-1030

Discharge Location:

Latitude: 47° 10' 31" N
Longitude 122° 01' 21" W

Plant Type:

Municipal Secondary Treatment - RBC
Chlorine disinfection

---

is authorized to discharge in accordance with
the special and general conditions which follow.

William H. Backous, P.E.
Southwest Region Supervisor
Water Quality Programs
Department of Ecology

10/94

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SPECIAL CONDITIONS

S1. EFFLUENT LIMITATIONS

A. Effluent Limitations

Beginning on the effective date of this permit and lasting through the expiration date the Permittee is authorized to discharge municipal wastewater at the permitted location subject to the following limitations:

	OUTFALL 001			
Parameter	**Monthly Avg.[1]**		**Weekly Avg.**	
BOD_5[2]	30 mg/L 336 lb/day 85% minimum removal		45 mg/L 504 lb/day	
TSS[2]	30 mg/L 336 lb/day 85% minimum removal		45 mg/L 504 lb/day	
Fecal Coliform	200/100mL		400/100mL	
pH	6.0 to 8.5 standard units			
	Monthly Avg.		**Daily Max.**	
	Interim	**Final**	**Interim**	**Final**
May-Oct Ammonia-N	3.5 mg/L	3 mg/L	9 mg/L	7 mg/L 99 lb/day
Nov-Apr Ammonia- N	5 mg/L	4 mg/L	12.5 mg/L	9 mg/L
Chlorine	0.5 mg/L	11 ug/L	0.7 mg/L	28.5 ug/L
Mercury			5 ug/L	0.12 ug/L
Whole Effluent Toxicity	The Permittee should note that there also may be additional effluent limits in S9. Acute Toxicity and S10. Chronic Toxicity.			

Table Footnotes:

[1]The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.

[2]The average monthly effluent concentration for BOD_5 and TSS shall not exceed 30 mg/L or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.

B. Compliance Assessment for Mercury

All metals are analyzed as total recoverable metals using the methods and detection and quantification levels specified below:

1. The method detection level (MDL) for mercury is 0.2 μg/L using cold vapor extraction absorption spectrometry and method number 245.1 or 245.2 from 40 CFR Part 136. The quantitation level (QL) for mercury is 1 μg/L (5 x MDL).

2. Since the final effluent limit for Mercury is below the QL, the QL for mercury will be used for assessment of compliance with the final effluent limits.

3. If the Permittee is unable to attain the MDL and QL in its effluent due to matrix effects, the Permittee shall submit a matrix specific MDL and QL to the Department by (nine months after permit issuance). The matrix specific MDL and QL shall be calculated as follows:

   MDL = 3.14 x (standard deviation of 7 replicate spiked samples). This corresponds to the calculation of the method detection limit, as defined in 40 CFR Part 136, Appendix B, with the provision that the MDL be calculated for a specific effluent matrix.

   The QL = 5 x MDL

   If the measured effluent concentration is below the QL as determined above, the Permittee shall report the measured value with the qualifier NQ for non-quantifiable.

C. Compliance Schedule

1. Beginning on the effective date of this permit, the Permittee shall comply with the interim effluent limitations for chlorine, ammonia, and mercury.

2. During the first year of the permit, the Permittee shall evaluate the possibility of achieving the final water quality based effluent limits through nonconstruction changes.

3. By (one year from the issuance date of this permit), the Permittee shall comply with the final effluent limitation for chlorine.

4. By (eighteen months from issuance date), the Permittee shall submit to the Department for review and approval, a plan and schedule to achieve compliance with the final water quality based effluent limits for ammonia and mercury. The schedule shall include interim milestones no more than one year apart as well as a final compliance deadline. The final compliance deadline shall be established to ensure compliance within the shortest practicable time and shall generally not exceed the expiration date of this permit.

5. The Permittee shall comply with the final effluent limitations for ammonia and mercury by the compliance deadline established under Condition C.4. above as approved by the Department.

D. Mixing Zone Descriptions

1. **Chronic**

a. The maximum boundaries of the mixing zone is defined as 300 feet downstream, 100 feet upstream, 26.74 feet width.

b. Dilution factors for Aquatic Life Criteria:

Annual =	6.1
May-Oct. =	6.1
Nov.- Apr. =	3.3

c. Dilution factors for Human Health Criteria:

Carcinogens =	9.0
Noncarcinogens =	6.6

2. **Zone of Acute Criteria Exceedance**

a. The maximum boundaries of the zone of acute criteria exceedance is defined as 30 feet downstream, 10 feet upstream, 26.75 feet width.

b. Dilution factors:

Annual =	1.5
May-Oct. =	1.5
Nov.- Apr. =	1.0

S2. TESTING SCHEDULE

A. Wastewater Compliance

The Permittee shall monitor the wastewater according to the following schedule:

Tests	Sample Point	Sampling Frequency	Sample Type
Flow, mgd.	Effluent	Continuous	24-hr measurement
pH	Final effluent	Daily (7/week)	Grab
BOD_5[a]	Influent Final effluent	2/week 2/week	24-hr Composite 24-hr Composite

Tests	Sample Point	Sampling Frequency	Sample Type
TSS[a]	Influent Final effluent	2/week 2/week	24-hr Composite 24-hr Composite
Fecal Coliform Bacteria	Final effluent[b]	2/week	Grab
Chlorine (Total Residual)	Chlorinated effluent[b] Final effluent	Daily (7/week) Daily (7/week)	Grab Grab
Total Ammonia as N[a]	Final effluent	2/week	Grab
Temperature	Final effluent	Daily (7/week)	Grab
Hardness	Final effluent	Monthly	Grab
Mercury[c]	Final effluent	Every other month	24-hr composite
Arsenic[d]	Final effluent	Quarterly	24-hour composite
Priority Pollutants[d]	Final effluent	2/year (wet and dry season) during 3rd and 4th year of permit only.	24-hr composite
Rainfall	Gauge near plant	Daily (7/week)	24-hr measurement

a. Data shall be reported both as concentrations (mg/L) and as mass loadings (lb/day).

b. The fecal coliform sample shall be taken concurrently with the chlorinated effluent sample.

c. Analysis for mercury is for total recoverable metal. The testing shall use the EPA approved methods identified in Condition S1.B.

d. Priority pollutant analysis includes the following metals measured as total recoverable metals: arsenic, cadmium, total chromium, copper, lead, mercury, nickel, and zinc. Organic pollutants shall be those listed in Table II of Appendix D of 40 CFR Part 122. All testing shall use EPA approved methods as noted in the table below with detection limits sufficiently low to accurately measure concentrations present in the effluent.

Chemical Type	Analytical Method
Metals	GFAA, cold vapor for mercury
Cyanide	EPA 335.2
Dioxin	EPA 1613
Volatile Compounds	EPA 601,602, and 603, or EPA 624
Base/Neutral/Acids	EPA 604, 605, 606, 607, 609, 610, 611, and 612, or EPA 625
Pesticides	EPA 608

Wastewater samples shall be taken at the following locations:

1. Influent is sampled at the influent sampling station located at the facility headworks.

2. Chlorinated effluent is sampled at the end of the chlorine contact chamber (prior to dechlorination).

3. Final effluent is sampled at the sampling station following dechlorination (or the final treatment process) prior to discharge to the outfall line. Final effluent for chlorine (if not dechlorinated) may be sampled at the final manhole in the outfall line prior to discharge to the White River.

B. Biosolids (Sludge) Compliance

The Permittee shall, at a minimum, monitor the sludge according to the following schedule:

1. Sludge production shall be reported annually (by February 19) as all of the following:

   a. The total equivalent dry weight produced (metric tons per 365 day period).

   b. The volume (gallons or cubic feet) of sludge as removed from the treatment plant site for use or disposal.

   c. The percent solids as its leaves the treatment plant site. If the percent solids of the sludges leaving the site varies, report quantities for each whole number percent solids estimate.

October 1994

FACT SHEET FOR RENEWAL OF NPDES PERMIT
CITY OF ENUMCLAW WASTEWATER TREATMENT PLANT
NPDES PERMIT NO. WA-002057-5

This fact sheet is a companion document to the draft National Pollutant Discharge Elimination System (NPDES) Permit No. WA-002057-5. The Department of Ecology (the Department) is proposing to issue this permit, which will allow discharge of treated municipal wastewater to waters of the State of Washington.

This fact sheet explains the nature of the proposed discharge, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for those decisions. Public involvement information is contained in Appendix A. Definitions are included in Appendix B. Technical calculations are shown in Appendix C.

A proposed permit and fact sheet were reviewed by the Permittee for verification of facts. Only factual items were corrected in the draft permit and fact sheet. Corrections made are shown in Appendix D. A response to substantive comments will be completed at the end of the public comment period and appended to this fact sheet.

I. GENERAL INFORMATION

Applicant:	City of Enumclaw 1309 Myrtle Avenue Enumclaw, WA 98022
Facility:	Enumclaw Wastewater Treatment Plant 451 Semanski Street South Enumclaw, King County, Washington
Treatment:	Municipal Secondary Treatment - RBC Chlorine Disinfection
Discharge Location:	White River at Enumclaw, River Mile 23.1
	Latitude: 47° 10 ' 31" N Longitude: 122° 01' 21" W
Water Body ID No.:	WA-10-1030

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III. RECEIVING WATER INFORMATION

Characteristic Uses

The White River is designated as a Class A, freshwater, receiving water in the vicinity of the outfall. Characteristic uses include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration, rearing and spawning; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; and commerce and navigation.

Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC. Criteria for this discharge are summarized below:

Fecal Coliform Organisms	100 colonies/100 mL maximum geometric mean.
Dissolved Oxygen	8 mg/L minimum.
Temperature (T° C)	18° C maximum. When natural conditions exceed 18° C , increase must be less than 0.30° C. Increases shall not exceed 28/(T° C + 7) at any time.
pH	6.5 to 8.5 standard units. Variation less than 0.5 units from background.
Turbidity	less than 5 NTU above background.
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics).
Aesthetics	No impairment.

Puyallup River Basin TMDL

The White River is part of the Puyallup River basin. The Puyallup River basin is undergoing rapid growth that promises increasing pollution pressure on the river and increasing requests for pollutant loadings. Beginning in 1990, the Department of Ecology conducted a TMDL (total maximum daily load) study for dissolved oxygen, ammonia and chlorine in the Puyallup River basin (White, Carbon, and Puyallup Rivers). The report from the study was published in June 1993. The TMDL study indicates that ammonia and chlorine discharged by existing permittees are likely to exceed water quality criteria. Dissolved oxygen criteria are also likely to be exceeded if significant new sources of biochemical oxygen demand (BOD) are introduced.

The study also indicates that water quality criteria for ammonia, dissolved oxygen, and chlorine can be met for the existing discharges through implementation of effluent limits based on the maximum allowable mixing zone as defined in WAC 173-201A-100.

In response to public comments, several changes were made to the 1993 report. The changes are documented in a July 22, 1994, memorandum titled "Addendum to the 1993 Puyallup River TMDL Report." Changes include elimination of the chlorine TMDL, minor revisions to the overall TMDLs for BOD and ammonia, revised waste load allocations (WLAs) for municipal and industrial dischargers, fish hatcheries, and the reserve WLA for water quality protection and further growth. The WLAs for McAlder Elementary School were also removed from the TMDL to reflect termination of the discharge.

In addition, the addendum provides recommendations for implementation of seasonal permit limits and exchanging a portion of an ammonia allocation to increase an allocation for BOD.

Section 303(d) of the Clean Water Act requires states and the Environmental Protection Agency to establish total maximum daily loads (TMDLs) for those waters which cannot meet water quality standards after application of technology based controls. The TMDLs proposed for the Puyallup River basin are:

20,322 pounds per day of BOD_5
3,350 pounds per day of ammonia (as nitrogen).

Waste load allocations for the Enumclaw facility are:

504 pounds per day of BOD_5
99 pounds per day of ammonia (as nitrogen) effective May 1 through October 31.

Additional information on the TMDL can be obtained in the July 1993 Ecology TMDL Report and the July 22, 1994 addendum.

Ambient Water Quality

The permitted outfall is located at river mile (RM) 23.1. Upstream of the discharge (RM 24.3), a large portion of the White River flow is diverted through Lake Tapps for power generation and then returned to the White River at RM 3.6. The instream flow of the natural White River channel below the City of Buckley (RM 21.8) is currently maintained above 130 cfs all year by agreement between Puget Sound Power and Light Company and the Muckleshoot Tribe. The White River channel in the vicinity of Enumclaw is maintained above 110 cfs and a fish screen return flow of 20 cfs is returned to the natural river channel below the City of Buckley's outfall.

Section 305(b) of the Clean Water Act requires the state to assess the quality of surface waters and to identify impairment of designated beneficial uses pursuant to the state water quality standards (WAC 173-201A). The most recent assessment indicates that the White River (RM 0 to 29.6) occasionally exceeds the fecal coliform criterion. The high fecal coliform count occurs after rainfall events and appears to be related to storm water runoff.

In addition, the upper bound of the water quality criteria for pH (6.5 to 8.5 standard units) is violated in the natural White River channel between the diversion to and outflow from Lake Tapps. Water quality toxicity criteria for ammonia are also seasonally affected by high temperature and pH. Conditions in the White River channel appear to be most limiting for ammonia between May and October.

For aquatic life protection, the critical condition for the White River is the seven day average low river flow with a recurrence interval of ten years (7Q10). Ambient data at critical conditions in the vicinity of the Enumclaw outfall was taken from the TMDL study which considered both historical data and an intensive monitoring study conducted in September-October 1990. The ambient data used for this permit include the most restrictive values in the immediate vicinity of the Enumclaw outfall (see Appendix C) as follows:

7Q10 low flow	110 cfs
Velocity	1.32 ft/sec
Depth	0.78 feet
Width	107 feet
Roughness (Manning N)	0.041
Slope	7.0 EE-3 (0.4 degrees)
Temperature	13° C
pH (high)	8.1 standard units
D. Oxygen	8.0 mg/L minimum
Total Ammonia-N	0.07 mg/L summer; 0.10 mg/L winter
Fecal Coliform	52/100 mL dry weather (>100/100 mL storm related)
Turbidity	35 NTU
Hardness	22.2 mg/L as CaCO3
Copper	2.8 ug/L estimated dissolved value
Lead	0.0 (blank contaminated)
Zinc	10 ug/L estimated dissolved value
All Other Metals	0.0 (below detection limits)

The critical river conditions for human health protection are defined in the federal register as the 30Q5 low flow (30-day average flows with a recurrence interval of five years) for noncarcinogens and the harmonic mean flow for carcinogens. The following summary statistics were estimated using the seven complete annual periods between November 6, 1986, and August 11, 1994:

Harmonic mean flow	218 cfs
30Q5 low flow	122 cfs

IV. FACILITY INFORMATION

General

The City of Enumclaw (Permittee) owns and operates this publicly-owned wastewater treatment plant (POTW). This plant has been designated as requiring a major permit by the United States Environmental Protection Agency (EPA).

The POTW was completed in May 1980. The POTW is classified as a Class II facility and is operated by a staff of four certified operators. The operator in responsible charge is certified at the Class II level. The POTW has a state accredited laboratory for general chemistry and microbiology. The Permittee sends whole effluent toxicity, metals, and priority pollutant samples to Metro for analysis.

The facility has a monitored 24-hour alarm system that notifies the operating personnel of a system failure during the hours an operator is not on duty. The plant also has an emergency on-site generator.

Collection System

The existing collection system consists of approximately 40 miles of separate gravity sewers (primarily concrete pipe) and seven pump stations with force mains. None of the lift stations have overflow

capabilities. The locations are indicated on a map included in the City of Enumclaw Sanitary Sewer Utility Element 1993, Hedges and Roth Engineering, June 1994.

The actual population served is 9,631 according to the NPDES application. Additional growth is anticipated. The Permittee has been notified that approval of two recent sewer extensions (Kobe and Fleischmen/McRae plans) is conditioned upon submittal of a final general sewer plan by December 1, 1994, which meets the requirements of Chapter 173-240 WAC. The draft permit requires submittal of the general sewer plan. Any additional sewer extensions must conform to the general sewer plan as approved by the Department.

The collection system experiences significant amounts of infiltration and inflow (I/I) especially in the older sections of town. Monitoring of flows vs. rainfall data indicates considerable inflow. Since the original collection system had combined sanitary and storm sewers, it is possible that some stormwater inflows remain.

The Permittee has performed a number of repairs to the collection system and continues its efforts to reduce the I/I. In 1993, the Permittee purchased TV equipment to further evaluate I/I sources. The existing collection system appears to have adequate capacity to normally transport the existing flows to the treatment plant. One bypass point exists at manhole A-7 located on the east side of Highway 410 across from the treatment plant. A bypass occurs when the volume of water exceeds the capacity of collection system to transport flows. The overflow manhole is an elevated invert with pressure-treated wood slats installed in a slide gate. The overflow is set for discharge at approximately 5 feet above the influent invert. The collection system is allowed to surcharge to a point of near flooding in upstream homes and businesses before the bypass becomes activated. The bypass flows combine with the treated effluent in the outfall line for discharge to the White River. As noted on the NPDES permit application, bypass could occur during exceptional storm events (100 year storm) for the protection of the treatment plant. The bypass has not been known to occur during the past four years and has occurred maybe twice in the history of the plant. Currently there is no mechanism to indicate if a bypass is occurring and there is no metering device to gauge the volume of discharge.

Farman's Pickle factory is the only significant industrial facility discharging to this municipal system. The factory has its own state waste discharge permit number ST4067. A pretreatment facility collects the process water (cucumber washing and brine) and contaminated stormwater. The wastewater is routed through an 8000 gallon surge tank, then into a 98,500 gallon aeration basin prior to discharge to the municipal collection system. According to the NPDES application, the wastestream discharged to the municipal system is characterized by the following parameters: BOD (572 mg/L), COD (1901 mg/L), TSS (2592 mg/L), settleable matter (273 ml/L), and nitrogen (22.2 mg/L).

The POTW also receives landfill leachate from the King County Enumclaw landfill.

Treatment Processes

A schematic of the treatment plant is shown in Appendix C. The facility includes the following components:

1. Three pre-rotation immersible nonclog centrifugal pumps were installed at the head works during the winter of 1992/93 as replacements for the original screw pumps.

2. Also in 1992/93, the original comminutor was replaced with a 6.0 mgd capacity channel grinder with rotating screen to grind solids in the waste stream. The structure has two divided channels with the grinder in one and a simple bar screen in the second channel.

3. Immediately downstream of the channel grinder is the Parshall flume to measure influent flows. The flume has an 18-inch throat with maximum flow capacity of 15.9 mgd.

4. An aerated grit chamber removes sand, gravel, and other heavy solids such as coffee grounds.

5. Two primary clarifiers remove most settleable solids.

6. Rotating biological contractors (RBCs) are used for secondary treatment. The flow to the RBC's can be diverted to all or any of the four trains of three shafts. The process is currently operated with two parallel flow trains of six shafts per train. Part of the flow can be diverted to the fourth shaft to decrease the loading on the first three shafts.

7. Two secondary clarifiers remove the biological solids produced in the RBCs.

8. A chlorine contact chamber for disinfection of final effluent. The contact chamber has 60 minutes of detention time at maximum monthly average design flow, and 20 minutes detention time at peak flows. The outfall line is currently used for additional contact time and chlorine removal. Effluent is sampled at the last manhole before discharge to the river.

9. The plant is designed to add dechlorination equipment, if necessary.

Residual Solids

Solids that settle out in the clarifiers are transported to a primary anaerobic digester for stabilization. Sludge is then transferred to a secondary digester for settling and thickening. The stabilized sludge is then pumped from the tank and hauled for land application at approved sites in King County. According to the data submitted with the NPDES application, the Permittee is in compliance with the requirements of 40 CFR 503 for a Class B sludge. The Permittee is investigating other options for beneficial use or disposal since land application sites may not remain available during wet weather.

Outfall

The on-site outfall line consists of 260 feet of 24-inch diameter pipe. The off-site outfall line is 30-inch diameter pipe. The outfall discharges on the bank of the White River just downstream of the State Road 410 bridge. During the late summer low flow period, the end of the diffuser is out of the receiving water and wastewater flows across the shore before entering the river. Consequently, the plume is hugging the shoreline for some distance downstream and proper mixing is delayed.

The White River is glacially fed and continuously changing both volume and course. Therefore, siting of an outfall is difficult in this dynamic environment. Extending the outfall would subject the line to the direct forces of high water currents and the outfall could be washed away. Installation of an extension to withstand the current would entail extensive construction. Changes in river course could require repeated moving of the outfall. The outfall could also be subject to plugging from sediment loads.

It appears preferable to retain the discharge location at present rather than to continue to disrupt the receiving environment in an attempt to provide better initial mixing. Maintaining the existing outfall will require source control and/or additional treatment at the POTW to meet water quality criteria near the point of discharge.

The outfall should be inspected on a regular basis to verify that warning signs are clearly visible and to ensure its integrity and continued function. Possible improvements or relocation should be addressed in conjunction with the engineering for future plant upgrades and expansion. The outfall was last inspected by Ecology on November 15, 1993.

V. SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The previous permit for this facility was issued on July 10, 1990, for a five year period ending July 10, 1995. The permit is scheduled for early reissuance in the fall of 1994 in conjunction with the implementation of the Puyallup River basin TMDL. An application for permit renewal was requested by the Department. It was submitted on May 6, 1994. Additional information was requested and submitted. The application was accepted as sufficient on August 30, 1994.

The facility was most recently inspected on December 3, 1993. Discharge monitoring reports indicate that the facility is in compliance with effluent limitations in the permit.

A letter from the Department dated March 16, 1994, allowed the Permittee to discontinue chronic whole effluent toxicity (WET) testing until the permit is reissued. The basis for this approval is that Chapter 173-205 WAC, effective November 6, 1993, established procedures for deriving WET limits which are different from the requirements in the existing permit. Both acute and chronic WET testing will be required at the time of permit reissuance.

A residual solids management plan update is required 180 days prior to expiration of permit. Information was submitted in conjunction with the application for permit renewal.

An outfall extension engineering report was required by July 1, 1990, plans and specifications by January 1991, and construction by January 1992. Although the deadlines have passed, it has been impractical to extend the outfall due to a number of reasons. The outfall location is discussed in Section IV (above) of this fact sheet.

VI. WASTEWATER CHARACTERIZATION

The effluent was monitored on regular basis for conventional municipal parameters including flow, pH, temperature, fecal coliform bacteria, biochemical oxygen demand BOD (5-day), total residual chlorine, total suspended solids, settleable solids, ammonia, and dissolved oxygen.

Priority pollutant heavy metals and the organic pollutants listed in Table II of Appendix D, 40 CFR 122 were monitored annually.

Chronic whole effluent toxicity testing was conducted quarterly for one year and then twice per year as required by the permit. Monitoring showed no chronic toxicity at all effluent concentrations. Testing was discontinued in March 1994 with approval of the Department.

The following technology-based limits are taken from WAC 173-221-040 and 050: technology-based mass effluent limits for BOD and TSS are based on the design criteria and WAC 173-220-130(3)(b) and 173-221-030(11)(b).

pH:

Shall be within the range of 6 to 9 standard units.

Fecal Coliform Bacteria:

Monthly Geometric Mean = 200 colonies/100ml
Weekly Geometric Mean = 400 colonies/100ml

BOD_5:

1. Monthly (30 day) average shall not exceed the more stringent of the following:

   a. 30 mg/L.
   b. Eighty five percent (85%) removal of the average influent concentration.
   c. 336 lb/day.
      Calculation: monthly design mass influent loading (2240 lb/day) X 0.15 (85% removal).

2. Weekly (7 day) average shall not exceed the more stringent of the following:

   a. 45 mg/L.
   b. 540 lb/day = (1.5) X 336 lb/day (monthly limit).

TSS:

1. Monthly (30 day) average shall not exceed the more stringent of the following:

   a. 30 mg/L.
   b. Eighty five percent (85%) removal of the average influent concentration.
   c. 336 lb/day.
      Calculation: monthly design mass influent loading (2240 lb/day) X 0.15 (85% removal).

2. Weekly (7 day) average shall not exceed the more stringent of the following:

   a. 45 mg/L.
   b. 540 lb/day = (1.5) X 336 lb/day (monthly limit).

WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Water Quality Standards. In addition, the Environmental Protection Agency issued 91 numeric water quality criteria for the protection of human health ("National Toxics

Rule," Federal Register, V.57, No. 246, Tuesday, December 22, 1992). The criteria are established to protect the beneficial uses of the receiving water.

For discussion of the classification and status of the receiving water, see Section III of this fact sheet.

Numerical Criteria

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards (Chapter 173-201A WAC) or in the National Toxics Rule ("National Toxics Rule," Federal Register, V.57, No. 246, Tuesday, December 22, 1992) which specify the allowable levels of pollutants in a receiving water.

Numeric criteria set forth in the Water Quality Standards or National Toxics Rule are used to derive the effluent limits in a discharge permit. When water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) are used to limit acute and chronic toxicity, radioactivity, and other deleterious materials, and prohibit the impairment of the aesthetic value of the waters of the state. Narrative criteria describe the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

Antidegradation Policy

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

Mixing Zone Authorization

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment at the point of discharge. The concentration of pollutants at the edge of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention and control (AKART).

Because of the potential for pollutants in the proposed discharge to exceed water quality criteria, a mixing zone has been authorized in this permit in accordance with Chapter 173-201A WAC. The mixing zone must meet the most stringent combination of the following:

1. Maximum allowable length = 300 feet downstream, 100 feet upstream.
2. Maximum allowable width (25% of the river width) = 26.75 feet.
3. Maximum allowable dilution factor based on 25% of the critical low flow. Calculation: (Effluent flow + 0.25 X critical low flow)/Effluent flow.

Dilution at Mixing Zone Boundaries for Aquatic Life Protection

Chronic: The critical condition for aquatic life protection is defined as the 7Q10 low flow which is 110 cfs. Equivalent seasonal 7Q20 low flows are also 110 cfs as shown in the Puyallup River basin TMDL Addendum, July 1994.

The maximum allowable dilution based of 25 percent of the 7Q10 is calculated as follows:

$$((2.4 \text{ MGD X } 1.547 \text{ cfs/MGD}) + (0.25 \text{ X } 110 \text{ cfs}))/(2.4 \text{ MGD X } 1.547 \text{ cfs/MGD}) = 8.4$$

The actual dilution at the boundaries of the allowable mixing zone was modelled using Rivplume, a model for the spread of a plume from a point source in a river assuming instantaneous vertical mixing of the effluent (Fischer et al., 1979). Both annual and seasonal dilution factors were modelled. Input data for the model was taken from the Puyallup River basin TMDL, June 1993 and Addendum, July 1994. Appropriate seasonal flows were calculated from the wastewater treatment plant discharge monitoring reports (DMRs).

The downstream distance was the limiting condition. The corresponding dilution factors are 6.1 for annual or summer (May-October) discharge conditions and 3.3 for winter (November-April) critical conditions. The winter dilutions are lower due to the possibility of controlled low flow receiving water discharges of 110 cfs and increased flows (I/I related) discharged from the POTW.

Acute: Acute toxicity criteria are to be met as near to the point of discharge as possible. A zone where acute criteria may be exceeded must meet the most stringent combination of the following:

1. Maximum allowable length = 30 feet downstream
   10 feet upstream.
2. Maximum allowable width = 26.75 feet.
   (25% of the river width).
3. Maximum allowable dilution factor = 1.5
   (based on 2.5% of the 7Q10 flow).

The actual dilution at the acute zone boundaries was also modelled using Rivplume. The downstream distance was the limiting condition. The modelled acute dilution factor is 1.5 for annual or summer (May-October) conditions and 1.0 for winter (November-April) critical conditions.

Water Quality-Based Limits for Aquatic Life Protection Numeric Criteria

Pollutants in an effluent may affect the aquatic environment near the nt of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic lutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even

after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water. Water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota and existing or characteristic water body uses.

Near-field Pollutants

Turbidity criteria are met at the point of discharge.

Temperature was modelled by simple mixing using the summer effluent temperature reported (degrees Celsius) at the boundary of the mixing zone as follows: (17.8° x 1 + 13° x 5.1)/6.1 = 13.8 degrees. The incremental increase of 0.8 is less than 28/(13 + 7) = 1.3 degrees. The water quality criteria are met within the boundaries of the authorized mixing zone and no additional limit is required.

Fecal coliform compliance (geometric mean) was modelled by mixing using the weekly technology-based effluent limits as follows: (log (400) x 1 + log (52) x 5.1)/6.1 = 1.861 (antilog = 72.7/100 mL). The water quality criteria are met within the boundaries of the authorized mixing zone; no additional limit is required.

The pH criteria are exceeded in the receiving water during low flow conditions. The upper limit for pH is therefore limited to the water quality standard of 8.5 standard units.

Toxics: The following toxics for which there are numeric criteria for aquatic life protection were determined to be present in the discharge: chlorine, ammonia, silver, arsenic, cadmium, copper, mercury, and zinc.

Appropriate water quality criteria were calculated in accordance with WAC 173-201A.

Seasonal criteria and effluent limitations were calculated for ammonia since lower winter temperatures effect the ability of the treatment plant to nitrify. Lower winter temperatures also reduce the ambient water quality toxicity criteria for ammonia. The calculations are shown in Appendix C. The proposed limitations are shown in Section VIII of this fact sheet.

To calculate water quality based criteria for metals, hardness was calculated via simple mixing at the boundaries of the acute and chronic mixing zones as follows:

(Effluent hardness + (Dilution factor (DF)-1) x ambient hardness)/DF = hardness
Acute: (98 mg/L + (1.5 - 1) x 22.2 mg/L)/1.5 = 72.7 mg/L
Chronic: (98 mg/L + (6.1 - 1) x 22.2 mg/L)/3.9 = 34.6 mg/L.

The Department applies metals criteria conservatively as total recoverable values in accordance with WAC 173-201A. The criteria in WAC 173-201A are written as dissolved criteria for copper, nickel, lead, silver, and zinc. Data was translated to total recoverable values using the procedure in the October 1993 EPA technical guidance memorandum for comparison with effluent concentrations. The Department

used the same factors established to translate the total recoverable water quality criteria to dissolved criteria in WAC 173-201A-040 to translate dissolved metals back to total recoverable metals.

A reasonable potential analysis (see Appendix C) was conducted on chlorine, ammonia, arsenic, silver, cadmium, copper, mercury, and zinc to determine whether or not effluent limitations would be required in this permit. Based on the analysis, a reasonable potential to exceed the aquatic life protection toxicity criteria was shown for ammonia, chlorine, and mercury. Effluent limitations were calculated for these parameters as shown in Appendix C.

Far-field Pollutants

Nutrients: The pH criterion is violated in the natural White River around RM 8. This is most likely due to algal productivity. Reduction may be achievable by limiting the amount of nutrients (nitrogen and phosphorus) discharged. However, nutrient loadings would have to be quite low (less than 0.10 mg/L dissolved inorganic nitrogen (DIN) or less than 0.025 mg/L soluble reactive phosphorus (SRP) to achieve the desired reduction. Reduction in point source loadings may not reduce ambient concentrations to the required levels. At this time, algal activity is not causing any aesthetic problems. A feasibility study for reduction in nutrients discharged is required in this permit.

Fecal coliform criterion is also violated downstream. Water quality data indicates that a significant fraction of the fecal coliform count is Klebsiella which is found in wood products and is not an indicator organism for the presence of human pathogens. Fecal coliform counts also appear to increase significantly after rain events indicating a non-point source of pollution. Since fecal coliform limits are not exceeded at the mixing zone boundaries during dry weather conditions, additional restrictions on the municipal discharge are not expected to improve the situation and are therefore not required in this permit.

TMDL: Daily maximum mass limitations (pounds/day) for ammonia and weekly maximum mass limitations for biochemical oxygen demand are based on the recommendations in the Puyallup River TMDL. These limits are effective from May 1 through October 31 and are expected to be protective of dissolved oxygen criteria in all segments of the Puyallup River basin.

Whole Effluent Toxicity

In addition to the requirement not to exceed specific chemical parameters, the Water Quality Standards require that the effluent not cause toxic effects in the receiving waters.

Because of the potential for the effluent to contain toxic chemicals, this permit contains requirements for whole effluent toxicity testing as authorized by the Revised Code of Washington (RCW) 90.48.520 and 40 CFR 122.44. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and so this approach is called whole effluent toxicity testing. Whole effluent toxicity testing is used to measure both acute toxicity and chronic toxicity.

Acute toxicity tests measure death as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Used alone, acute toxicity tests are insufficient indicators of potential environmental harm from effluent toxicity. Additional tests, which are needed to measure various sublethal toxic responses such as retarded growth or reduced reproduction, are known as chronic toxicity tests. Chronic toxicity tests involve either a complete life cycle test of an organism with an extremely short life cycle or a test on a critical stage of a test organism's life.

This permit requires the Permittee to test the effluent to determine if acute or chronic toxicity is present as a pollutant. For acute toxicity, if the median survival of any species tested is less than 80 percent or if survival in any test is less than 65 percent in 100 percent effluent, acute toxicity effluent limitations are established in the permit. For chronic toxicity, if any test using the ACEC (the acute critical effluent concentration allowable at the boundary of the authorized acute mixing zone) shows a significant difference in toxicity from the control, chronic toxicity effluent limitations are established in the permit. If it is determined that a risk to aquatic biota exists, the Permittee is required to investigate and reduce or eliminate any source of the toxicity.

In accordance with WAC 173-205-030(4), the Department may delay effluent characterization for whole effluent toxicity for existing facilities that are under a compliance schedule to achieve compliance with water quality-based effluent limits. Since the Permittee is on a compliance schedule to meet chlorine water quality-based limits, the whole effluent toxicity characterization will occur during the second year of this permit.

Water Quality Based Effluent Limits for Human Health Protection

The 91 numeric water quality criteria for the protection of human health ("National Toxics Rule," Federal Register, V.57, No. 246, Tuesday, December 22, 1992) are established to protect the beneficial uses of fish and shellfish consumption as well as surface drinking water supplies.

Based on the Permittee's status as a major discharger, the Department has determined that there is a likelihood that one or more of the regulated pollutants are present in the discharge. Annual priority pollutant scans conducted by the discharger show that most parameters are below the detection limits used for the scan. Mercury, arsenic and lindane were detected in the effluent. A reasonable potential analysis was conducted in accordance with Ecology's Permit Writer's Manual 1994 update. Dilution at mixing zone boundaries was calculated using the harmonic mean flow for carcinogens and the 30Q5 low flow for non-carcinogens. Calculations are shown in Appendix C. The analysis indicates that there is a reasonable potential to exceed the human health criteria for mercury and possibly for arsenic.

Effluent limitations based on human health criteria were calculated for mercury as shown in Appendix C. However, since the mercury effluent limitations required for aquatic life protection are more stringent, the aquatic life protection limits are used in this permit.

Effluent limitations for arsenic were calculated as shown in Appendix C but are not required in this permit for the following reasons:

1. The human health criteria for arsenic are based on inorganic arsenic rather than total recoverable arsenic. The arsenic data available is for total recoverable arsenic. There is currently no EPA-approved method for measuring inorganic arsenic.

2. There are only three samples which detected arsenic in the effluent. All three estimated total arsenic concentrations were only slightly above the detection limit.

3. The quantitation level (QL) is used as a compliance limit when calculated limits are below that level. Since the QL is much higher than the arsenic concentrations measured in the effluent, establishing effluent limits at this time provides no environmental benefit.

However, since arsenic has been detected in the effluent, this permit does require quarterly monitoring to more accurately assess concentrations over time.

Since several pollutants in the priority pollutant scans conducted were analyzed with methods at detection limits higher than the established EPA detection and quantification levels, priority pollutant scans shall be required during the wet and dry season (twice per year) in the third and fourth year of this permit. These priority pollutant scans shall be conducted using the methods recommended in Ecology's Permit Writer's Manual 1994 update. The methods are shown below:

APPENDIX C--TECHNICAL CALCULATIONS

FLOW CALCULATIONS:

Discharge monitoring report data for flow is presented on an excel spreadsheet in this section. The following flow data is used in calculating dilution factors and effluent limits in the draft permit:

1. 2.4 MGD = Monthly average design flow, maximum month is used in calculations for effluent mixing models for wet weather (November-April and December-April) chronic dilution factors for aquatic life protection.

2. 4.0 MGD = Historical maximum wet weather daily flow is used in calculations for effluent mixing models for wet weather acute dilution factors for aquatic life protection (assuming no growth in I/I over life of permit).

3. 1.3 MGD = Monthly average projected (estimate for growth) dry weather flow is used in calculations for effluent mixing models for annual and dry weather (May-October) chronic dilution factors for aquatic life and human health (non-carcinogen) protection.

4. 1.7 MGD = Maximum daily projected dry weather flow is used in calculations for effluent mixing models for annual and dry weather (May-October) acute dilution factors for aquatic life protection.

5. 1.52 MGD = Annual average projected (estimate for growth) flow is used in calculations for effluent mixing models for dilution factors for human health (carcinogen) protection.

CALCULATION OF DILUTION FACTORS

Aquatic Life Protection - Ambient critical flow = 110 cfs (7Q10) low flow. Since the flow is regulated by the Lake Tapps diversion, 110 cfs is also the seasonal low flow. The data is taken from the Puyallup River basin TMDL document, amended July 994, NPDES Permit Application, Discharge Monitoring Reports and on-site visits.

The data is taken from the Puyallup River basin TMDL document, amended July 994, NPDES Permit Application, Discharge Monitoring Reports and on-site visits.

Human Health Protection - Ambient critical flow = 122 cfs, the 30Q5 low flow for noncarcinogens and = 218 cfs, the harmonic mean flow, for carcinogens. The statistics were estimated using the seven complete annual periods between November 6, 1986 and August 11, 1994 (Pelletier, August, 94)

Model Used - The Department evaluated dilution factors for both summer and winter acute and chronic conditions as well as for human health creature conditions at the boundaries of the authorized mixing zone(s) using WAC 173-201A and the Rivplume model (Fischer, et. al). Spreadsheets of the calculations are included.

DETERMINATION OF REASONABLE POTENTIAL

Reasonable potential for aquatic life creature was calculated using the method in EPA, 1991. Reasonable potential for human health criteria was calculated using the method in the Ecology Permit Writer's Manual, 1994 update. Calculations are shown on the accompanying spreadsheet. The following variables were used for each pollutant to determine the reasonable potential for violations:

Coefficient of Variation (CV)

This is a measure of variability of a pollutant in the effluent and is calculated as the standard deviation divided by the mean. When less than ten data points are available a value of 0.6 is used (EPA 1991). This value is representative of the variability of the conventional pollutants from municipal treatment plants and therefore is used to estimate the variability of other pollutants.

Number of Samples (n)

The number of samples of the pollutant measured in the effluent from which the determination is being made.

Effluent Maximum Concentration

The highest value of the data points used.

Multiplier

For aquatic life criteria, a value calculated as shown in EPA,1991 to estimate the expected maximum concentration of the pollutant (95th percentile) in the effluent at a 99 percent confidence level by multiplying the value by the effluent maximum concentration.

For human health criteria, a value calculated as shown in Ecology, 1994 to estimate the expected average concentration of the pollutant (50th percentile) in the effluent at a 99 percent confidence level by multiplying the value by the effluent maximum concentration.

Acute and Chronic Dilution Factors

The dilution factors calculated for this discharge at the boundaries of the authorized mixing zone.

Ambient Concentration

Background concentration of the pollutant in the receiving water.

Water Quality Criterion

Value for the pollutant as determined from Chapter 173-201A WAC or by the National Toxics Rule.

CITY OF ENUMCLAW WASTEWATER TREATMENT PLANT
NPDES PERMIT NO. WA - 002057-5
FLOW DATA

	Annual			Summer/Dry Weather			Winter/Wet Weather		
Date	Avg Flow MGD	Max Flow MGD	Peaking Ratio	Avg Flow MGD	Max Flow MGD	Peaking Ratio	Avg Flow MGD	Max Flow MGD	Peaking Ratio
Mar-94	1.70	2.20	1.29				1.70	2.20	1.29
Feb-94	1.50	2.10	1.40				1.50	2.10	1.40
Jan-94	1.40	1.60	1.14				1.40	1.60	1.14
Dec-93	1.10	1.30	1.18				1.10	1.30	1.18
Nov-93	1.10	1.10	1.00				1.10	1.10	1.00
Oct-93	1.00	1.10	1.10	1.00	1.10	1.10			
Sep-93	1.00	1.10	1.10	1.00	1.10	1.10			
Aug-93	1.00	1.20	1.20	1.00	1.20	1.20			
Jul-93	1.10	1.30	1.18	1.10	1.30	1.18			
Jun-93	1.20	1.60	1.33	1.20	1.60	1.33			
May-93	0.90	1.00	1.11	0.90	1.00	1.11			
Apr-93	1.10	1.60	1.45				1.10	1.60	1.45
Mar-93	1.30	1.47	1.13				1.30	1.47	1.13
Feb-93	1.40	1.50	1.07				1.40	1.50	1.07
Jan-93	1.60	3.40	2.13				1.60	3.40	2.13
Dec-92	1.60	2.50	1.56				1.60	2.50	1.56
Nov-92	1.50	2.20	1.47				1.50	2.20	1.47
Oct-92	1.00	1.40	1.40	1.00	1.40	1.40			
Sep-92	0.90	1.30	1.44	0.90	1.30	1.44			
Aug-92	0.90	1.20	1.33	0.90	1.20	1.33			
Jul-92	1.00	2.00	2.00	1.00	2.00	2.00			
Jun-92	0.70	1.00	1.43	0.70	1.00	1.43			
May-92	0.70	0.90	1.29	0.70	0.90	1.29			
Apr-92	1.00	1.80	1.80				1.00	1.80	1.80
Mar-92	0.90	1.60	1.78				0.90	1.60	1.78
Feb-92	1.30	2.90	2.23				1.30	2.90	2.23
Jan-92	1.50	4.00	2.67				1.50	4.00	
Dec-91	1.10	2.50	2.27				1.10	2.50	2.27
Nov-91	1.10	2.50	2.27				1.10	2.50	2.27
Oct-91	0.60	0.70	1.17	0.60	0.70	1.17			
Sep-91	0.60	0.70	1.17	0.60	0.70	1.17			
Aug-91	0.60	0.80	1.33	0.60	0.80	1.33			
Jul-91	0.60	0.70	1.17	0.60	0.70	1.17			
Jun-91	0.70	0.90	1.29	0.70	0.90	1.29			
May-91	0.90	1.20	1.33	0.90	1.20	1.33			
Maximum	**1.70**	**4.00**		**0.90**	**1.20**		**1.50**	**4.00**	
Average	**1.07**		**1.46**			**1.30**			**1.46**
Design	**2.40**			**1.40**			**2.40**		
% of Design	**0.71**			**0.64**					
Flows Used for Aquatic Life Criteria									
ALC mgd	2.4	4.0		1.3	1.7		2.4	4.0	
cfs	3.7	6.2		2.0	2.6		3.7	6.2	
Flows Used for Human Health Criteria									
HHC mgd	1.52			1.3					
cfs	2.35			2.0					

City of Enumclaw
NPDES Permit No. WA-002057-5
Human Health Criteria (Carcinogens) Dilution Modelling
Annual Average Effluent Flow/Harmonic Mean River Flow

Spread of a plume from a point source in a river with and without boundary effects from the shoreline (Fischer et al., 1979).

LOTUS FILE RIVPLUME.WK1

INPUT * ********* ********* ********* ********* ********* ******* *************

1. Effluent Discharge Rate (cfs)	2.35
2. Receiving Water Characteristics Downstream From Waste Input	
Stream Depth (ft)	0.96
Stream Velocity (fps)	1.94
Channel Width (ft)	117.74
Stream Slope (ft/ft)	7.00E-03
3. Discharge Distance From Nearest Shoreline (ft)	0.00
4. Location of Point of Interest to Estimate Dilution	
Distance Downstream to Point of Interest (ft)	300.00
Distance From Nearest Shoreline (ft)	0.00

OUTPUT ********* ********* ********* ********* ********* ******* *************

1. Source Conservative Mass Input Rate	
Concentration of Conservative Substance (%)	100.00
Source Conservative Mass Input Rate (cfs*%)	235.00
2. Shear Velocity (fps)	0.465
3. Transverse Mixing Coefficient (ft2/sec)	0.268
4. Plume Characteristics Assuming No Shoreline Effect	
Unbounded Plume Width at Point of Interest (ft)	36.413
Concentration at Point of Interest (Fischer Eqn 5.7)	5.53E+00
5. Plume Characteristics Accounting for Shoreline Effect	
Co	1.07E+00
x'	2.99E-03
y'	0.00E+00
y' at point of interest	0.00E+00
Solution using superposition equation (Fischer eqn 5.9)	
Term for n= -2	0.00E+00
Term for n= -1	9.93E-146
Term for n= 0	2.00E+00
Term for n= 1	9.93E-146
Term for n= 2	0.00E+00
C/Co (dimensionless)	1.03E+01
Concentration at Point of Interest (Fischer Eqn 5.9)	1.11E+01
Approximate Downstream Distance to Complete Mix (ft)	40,149
Theoretical Dilution Factor at Complete Mix	93.310
Calculated Dilution Factor at Point of Interest	**9.04**

******* ********* ********* ********* ********* ********* ******* *************

City of Enumclaw Wastewater Treatment Plant
NPDES Permit No. WA-002057-5
Department of Ecology Effluent Data for WQ Based Parameters

Parameter	Units	1990 TMDL Data				Plant DMR Data Jan-92	Plant DMR Data Feb-93	Plant DMR Data Jan-94	Average	Maximum	
Gamma-BHC (Lindane)	ug/L					0.1*	U	U		0.1*	
Turbidity	NTU	4.90	U	4.20					0.70	4.90	Detection
Hardness	mg/L	101.00	102.00	98.00	98.10				99.78	102.00	Level
Silver	ug/L	0.82	1.19	0.60	1.11				0.93	1.19	0.05
Arsenic	ug/L	'U'	1.4'J'	1.2'J'	1'J'				1.20	1.40	1.00
Cadmium	ug/L	.19J	.19J	B	.16J				0.18	0.19	0.10
Copper	ug/L	42.50	49.10	49.40	37.80	42.00	51.00	39.00	44.40	51.00	2.00
Mercury	ug/L	U	.13J	.11J	.065J		2**	U		0.13**	0.02
Zinc	ug/L	34.10	39.00	34.60	33.00	30.00	61.00	49.00	40.10	61.00	2.00

All metals are total recoverable values

* 0.1 is the detection limit for this parameter.

** Mercury value sampled in February 1993 is discarded since out of line with other values. Suspect contamination.

U= the analyte was not detected at or above the reported result

J = the analyte was positively identified. The reported value is an estimate

B= the analyte was also found in analytical method blank; sample may have been contaminated

City of Enumclaw
NPDES Permit No. WA-002057-5
Human Health Criteria (Non-carcinogens) Dilution Modelling
Projected Dry Weather Effluent Flow / 30Q5 Low River Flow

Spread of a plume from a point source in a river with and without boundary effects from the shoreline (Fischer et al., 1979).

LOTUS FILE RIVPLUME.WK1

INPUT * ********* ********* ********* ********* ********* ******* *************

1. Effluent Discharge Rate (cfs)	2.00
2. Receiving Water Characteristics Downstream From Waste Input	
Stream Depth (ft)	0.80
Stream Velocity (fps)	1.40
Channel Width (ft)	108.55
Stream Slope (ft/ft)	7.00E-03
3. Discharge Distance From Nearest Shoreline (ft)	0.00
4. Location of Point of Interest to Estimate Dilution	
Distance Downstream to Point of Interest (ft)	300.00
Distance From Nearest Shoreline (ft)	0.00

OUTPUT ********* ********* ********* ********* ********* ******* *************

1. Source Conservative Mass Input Rate	
Concentration of Conservative Substance (%)	100.00
Source Conservative Mass Input Rate (cfs*%)	200.00
2. Shear Velocity (fps)	0.425
3. Transverse Mixing Coefficient (ft2/sec)	0.204
4. Plume Characteristics Assuming No Shoreline Effect	
Unbounded Plume Width at Point of Interest (ft)	37.385
Concentration at Point of Interest (Fischer Eqn 5.7)	7.62E+00
5. Plume Characteristics Accounting for Shoreline Effect	
Co	1.65E+00
x'	3.71E-03
y'	0.00E+00
y' at point of interest	0.00E+00
Solution using superposition equation (Fischer eqn 5.9)	
Term for n= -2	0.00E+00
Term for n= -1	1.38E-117
Term for n= 0	2.00E+00
Term for n= 1	1.38E-117
Term for n= 2	0.00E+00
C/Co (dimensionless)	9.27E+00
Concentration at Point of Interest (Fischer Eqn 5.9)	1.52E+01
Approximate Downstream Distance to Complete Mix (ft)	32,373
Theoretical Dilution Factor at Complete Mix	60.788
Calculated Dilution Factor at Point of Interest	**6.56**

******* ********* ********* ********* ********* ********* ******* *************

CITY OF E[illegible]CLAW
NPDES PERMIT NO .WA-002057-5
AMBIENT MONITORING DATA FOR METALS
FROM PUYALLUP TMDL STUDY

White River Data			Silver (Ag)			(Arsenic (As)	Cadmium (Cd)			Chromium (Cr)
River Mile	Date	Hardness	Total Rec.	Dissolved	D/TR	Total Rec.	Total Rec.	Dissolved	D/TR	Total Rec.
25.2	9/18/90	22.2	0.05 U	0.05 U	U	1 U	0.1 U	0.23 JB	U	5 U
25.2	9/19/90	22.2	0.05 U	0.05 U	U	1 U	0.1 U	0.1U	U	5 U
25.2	10/2/90	23.1	0.05 U	0.05 U	U	1 U	0.1 U	0.1U	U	5 U
25.2	10/3/90	26.2	0.05 U	0.05 U	U	1U	0.1 U	0.1U	U	5 U
23.1	9/18/90	23.3	0.05 U	0.05 U	U	1U	0.1 U	0.1U	U	5 U
23.1	10/2/90	27.4	0.05 U	0.05 U	U	1U	0.18J	0.1U	U	5 U
Permit Values		22.2	U	U	U	U	0.18J	U	U	U

River Mile	Date	Copper (Cu) Total Rec.	Copper (Cu) Dissolved	Copper (Cu) D/TR	Mercury (Hg) Total Rec.	Nickel (Ni) Total Rec.	Nickel (Ni) Dissolved	Nickel (Ni) D/TR
25.2	9/18/90	2 U	1U	0.50	0.04 U	10 U	10 U	U
25.2	9/19/90	2.4J	1U	0.42	0.04 U	10 U	10 U	U
25.2	10/2/90	5.4J	2.8J	0.52	0.04U	10 U	10 U	U
25.2	10/3/90	2U	2.4J	1.00	0.04U	10 U	10 U	U
23.1	9/18/90	2U	2U	U	0.04U	10 U	10 U	U
23.1	10/2/90	4.9J	2U	0.41	0.04U	10 U	10 U	U
Permit Values		5.4	2.8	1.00	U	U	U	1.00

River Mile	Date	Lead (Pb) Total Rec.	Lead (Pb) Dissolved	Lead (Pb) D/TR	Zinc (Zn) Total Rec.	Zinc (Zn) Dissolved	Zinc (Zn) D/TR
25.2	9/18/90	0.91 BJ	3.02B	B	5.9J	3.4JB	B
25.2	9/19/90	1.1 BJ	0.36BJ	B	6J	5.8BJ	BJ
25.2	10/2/90	1.1BJ	1.1BJ	BJ	6.1BJ	8.8J	BJ
25.2	10/3/90	0.62BJ	1.7BJ	BJ	5.3J	6.7JB	BJ
23.1	9/18/90	0.89BJ	1 BJ	BJ	6.9J	12BJ	BJ
23.1	10/2/90	1.2BJ	0.83BJ	BJ	15JB	10J	BJ
Permit Values		B	B	1.00	6.9	10	1.00

U = Analyte undetected at specified detection limit - assume zero for calculations
J = Analyte detected, value estimated. Assume value equals detection limit for calculations.
B = Analyte also detected in blank, sample may be contaminated.
For dissolved to total (D/TR) , default value is 1.00 if undeterminable.

0.52

WATER QUALITY AQUATIC LIFE CRITERIA CALCULATIONS (IN uG/L unless otherwise noted)						
POLLUTANT (Reference WAC 173-201A-040)	PRIORITY POLLUTANT?	HARDNESS Acute	HARDNESS Chronic	CARCI-NOGEN?	FRESH ACUTE	FRESH CHRONIC
ALDRIN/DIELDRIN	Y			Y	2.50	0.0019
AMMONIA as N (mg/L)	N			N	4.58	0.88
ARSENIC(TRI)	Y			Y	360.	190.
CADMIUM - Hardness dependent	Y			N	2.7374	0.4929
Enter hardness in next column		72.700	34.600			
CHLORDANE	Y			Y	2.4	0.0043
CHLORIDE (Dissolved)					860.0mg/l	230.0mg/l
CHLORINE (Total Residual)	N			N	19.	11.
CHLORPYRIFOS	N			N	0.083	0.041
CHROMIUM(HEX)	Y			N	16.	11.
CHROMIUM(TRI) - Hardness dependent	N			N	1337.44	86.78
Enter total hardness next column>		72.700	34.600			
COPPER - Hardness dependent	Y			N	13.1259	4.7742
Enter total hardness in next column>		72.700	34.600			
CYANIDE	Y			N	22.	5.2
DDT (and metabolites)	Y			Y	1.1	0.001
DIELDRIN /ALDRIN	Y			Y	2.5	0.0019
ENDOSULFAN	Y			N	0.22	0.056
ENDRIN	Y			N	0.18	0.00_
HEPTACHLOR	Y			Y	0.52	0.0038
HEXACHLOROCYCLOHEXANE (LINDANE)	Y			Y	2.00	0.08
LEAD - Dependent on hardness	Y			N	19.2192	0.8239
Enter total hardness in next column>		72.700	34.600			
MERCURY	Y			N	2.4	0.012
NICKEL - Dependent on hardness	Y			N	1227.895	64.238
Enter total hardness in next column>		72.700	34.600			
PARATHION	N			N	0.065	0.013
PENTACHLOROPHENOL (PCP) pH dependent	Y			N	24.78	15.64
Enter pH in next column >		8.00				
POLYCHLORINATED BIPHENYLS (PCB's)	Y			Y	2.00	0.014
SELENIUM	Y			N	20.00	5.00
SILVER - dependent on hardness.	Y			N	2.3455	
Enter hardness in next column>		72.700	34.600			
TOXAPHENE	Y			Y	0.73	0.0002
ZINC- hardness dependent enter	Y			N	89.3193	43.1252
hardness in next column >		72.700	34.600			

8/24/94
11:14 AM
ENU-CAL.XLW

REASONABLE POTENTIAL CALCULATION

This spreadsheet calculates the reasonable potential to exceed water quality criteria for human health protection.

PARAMETER	AMBIENT CONC. *ug/L*	MAXIMUM CONC. at MIX ZONE BOUNDARY *ug/L*	WQ STANDARD *ug/L*	**LIMIT REQ'D?**	COMMENTS	AQUATIC LIFE LIMIT
Gamma-BHC(Lindane)	U	0.013	0.019	**No**	Carcinogen	No
Arsenic	U	0.156	0.018	**Yes**	Carcinogen	No
Mercury	U	0.30	0.140	**Yes**	Non-carcinogen	Yes

U=the analyte was not detected at or above the reported detection level.
J= the analyte was positively identified. The reported value is an estimate.
B= the analyte was also found in the analytical method blank; sample may have been contaminated.

REASONABLE POTENTIAL CALCULATION

CALCULATIONS:								
CONFIDENCE LEVEL	0.95							
(in decimal)			EFFLUENT					
	PROB'TY BASIS		MAX CONC.	COEFF VAR		# OF SAMPLES	MULTI PLIER	DIL'N FACTOR
PARAMETER		*Pn*	*ug/L*	*CV*	σ	*n*		
Gamma-BHC(Lindane)	0.95	0.37	0.10	0.60	0.55	3	1.20	9.0
Arsenic	0.95	0.47	1.40	0.60	0.55	4	1.00	9.0
Mercury	0.95	0.47	2.00	0.60	0.55	4	1.00	6.6

WATER QUALITY BASED PERMIT LIMIT CALCULATIONS

PERMIT LIMIT CALCULATION SUMMARY

DILUTION FACTOR IS THE INVERSE OF PERCENT EFFLUENT CONCENTRATION AT THE EDGE OF THE ACUTE OR CHRONIC ZONE

PARAMETER	ACUTE DIL'N FACTOR	CHRONIC DIL'N FACTOR	AMBIENT CONC.	STATE WATER QUALITY STANDARD ACUTE	STATE WATER QUALITY STANDARD CHRONIC	AVERAGE MONTHLY LIMIT (AML)	MAXIMUM DAILY LIMIT (MDL)
Aquatic Life							
AMMONIA (mg/l)							
Annual	1.5	6.1	0.10	4.58	0.88	**2.97**	**6.82**
May-October	1.5	6.1	0.07	4.58	0.88	**2.98**	**6.84**
November-April	1.0	3.3	0.10	9.10	1.70	**3.85**	**8.84**
May-November	1.5	6.1	0.07	4.58	0.88	**2.98**	**6.84**
December-April	1.0	3.3	0.10	11.60	1.80	**4.09**	**9.38**
CHLORINE (ug/L)	1.5	6.1	0.00	19.00	11.00	**10.88**	**28.50**
MERCURY (ug/L)	1.5	6.1	0.00	2.40	0.012	**0.08**	**0.12**
Human Health							
MERCURY(HHC) (ug/L)	########	6.60	0.00	##########	0.14	**1.04**	**1.52**
ARSENIC (ug/L)	########	9.00	0.00	##########	0.02	**0.18**	**0.27**

Effluent limits for ammonia were calculated both on a seasonal and on a year round basis. Although the chronic dilution is lower is the winter due to high flows from the treatment plant, ammonia water quality standards are less stringent due to lower ambient temperatures. Seasonal limits May-October and November-April were used in the permit. Data used is taken from the February 1994 Puyallup TMDL memorandum for seasonal ambient conditions.

For Mercury, the effluent limit for aquatic life protection is below the instrument detection limit of 0.2 ug/L. The compliance limit for Mercury daily maximum is therefore set at the quantification level of 1.0 ug/L which is also sufficient to meet the human health critieria.

For Arsenic, the effluent limit for human health protection is below the instrument detectionlimit of 1.0 ug/L. The compliance limit for Arsenic, maximum daily is therefore set at the quantification level of 5.0 ug/L. The monthly average is set at the measured value with all measurements below detection counted as zero.

WATER QUALITY BASED PERMIT LIMIT CALCULATIONS

WASTE LOAD ALLOCATION (WLA) AND LONG TERM AVERAGE (LTA) CALCULATIONS							PERMIT LIMIT CALCULATIONS					
WASTE LOAD ALLOC. (WLA) ACUTE	WASTE LOAD ALLOC. (WLA) CHRONIC	LONG TERM AVERAGE (LTA) ACUTE	LONG TERM AVERAGE (LTA) CHRONIC	LTA COEFF VAR (CV)	LTA PROB'Y BASIS	LIMITING LTA	AVERAGE MONTHLY LIMIT (AML)	MAXIMUM DAILY LIMIT (MDL)	COEFF VAR (CV)	AML PROB'Y BASIS	MDL PROB'Y BASIS	# OF SAMPLES PER MONTH
6.82	4.86	2.19	2.56	0.60	0.99	2.19	2.97	6.82	0.60	0.95	0.99	9.00
6.84	5.01	2.19	2.64	0.60	0.99	2.19	2.98	6.84	0.60	0.95	0.99	9.00
9.10	5.38	2.92	2.84	0.60	0.99	2.84	3.85	8.84	0.60	0.95	0.99	9.00
6.84	5.01	2.19	2.64	0.60	0.99	2.19	2.98	6.84	0.60	0.95	0.99	9.00
11.60	5.71	3.72	3.01	0.60	0.99	3.01	4.09	9.38	0.60	0.95	0.99	9.00
28.50	67.10	9.15	35.39	0.60	0.99	9.15	10.88	28.50	0.60	0.95	0.99	30.00
3.60	0.07	1.16	0.04	0.60	0.99	0.04	0.08	0.12	0.60	0.95	0.99	1.00
########	0.92	########	0.49	0.60	0.99	0.49	1.04	1.52	0.60	0.95	0.99	1.00
########	0.16	########	0.09	0.60	0.99	0.09	0.18	0.27	0.60	0.95	0.99	1.00

A coefficient of variation (CV) of 0.6 was used as recommended in EPA 91 when there are less than ten data points for calculation.

# of samples per month reflects frequency stated in permit. Twice per week for ammonia and daily for chlorine. A minimum number of 1 was used for mercury and arsenic which are sampled once per month.

City of Enumclaw
NPDES Permit No. WA-002057-5
Performance Based Effluent Calculations
To Establish Interim Limits

Copper	y=ln(x)	(y-mu)^2		Zinc	y=ln(x)	(y-mu)^2
42.50	3.75	0.001		34.10	3.53	0.018
49.10	3.89	0.011		39.00	3.66	0.000
49.40	3.90	0.013		34.60	3.54	0.014
37.80	3.63	0.024		33.00	3.50	0.028
42.00	3.74	0.002		30.00	3.40	0.068
51.00	3.93	0.021		61.00	4.11	0.201
39.00	3.66	0.015		49.00	3.89	0.053
SUM	26.51	0.09		SUM	25.64	0.38
Mu(y)	3.79			Mu(y)	3.66	
Sigma^2(y)		0.01		Sigma^2(y)		0.06
Sigma(y)		0.12		Sigma(y)		0.25
E(x)		44.45		E(x)		40.21
V(x)		29.24		V(x)		106.10
Sigma^2(n)		0.00		Sigma^2(n)		0.02
Mu(n)		3.79		Mu(n)		3.69
Sigma(n)		0.0608		Sigma(n)		0.128
Mercury	**y=ln(x)**	**(y-mu)^2**		**Arsenic**	**y=ln(x)**	**(y-mu)^2**
U				U		
0.13	-2.04	0.082		1.40	0.34	0.027
0.11	-2.21	0.014		1.20	0.18	0.000
0.07	-2.73	0.165		1.00	0.00	0.030
U				Sum	0.52	0.120
Sum	-6.98	0.26		delta	0.25	
delta	0.40			k-r	3.00	
k-r	3.00			Mu(y)	0.17	
Mu(y)	-2.33			Sigma^2(y)		0.06
Sigma^2(y)		0.13		Sigma(y)		0.24
Sigma(y)		0.36		Z(.99)*	0.99	2.22
Z(.99)*	0.98	2.05		E(X)		1.17
E(X)		0.14		V(X)		0.2925
V(X)		0.0037		delta^n		0.0039
delta^n		0.026		A		0.054
A		0.049		B		-0.003
B		-0.053		C		0.007
C		0.075		Sigma^2(n)		0.052
Sigma^2(n)		0.042		Mu(n)		0.130
Mu(n)		-1.98		Z(.95)*	0.93	1.501
Z(.95)*	0.92	1.383		Sigma (n)		0.229
Sigma(n)		0.205				

CITY OF ENUMCLAW ,NPDL[illegible]ERMIT NO. WA-002057-5
PERFORMANCE-BASED INTERIM LIMITS WORKSHEET

AMMONIA PERMIT LIMIT CALCULATIONS BASED
ON A LOGNORMAL DISTRIBUTION , OVER 100 INDIVIDUAL DATA POINTS
PRESELECTED SAMPLING FREQUENCY

Parameter	LN(x) standard deviation sd	LN(x) Mean (LTA) LTA	Variability of Averages V(X)	Expected Value of Averages E(Xn)	Average Monthly Limit AML	Maximum Daily Limit MDL	AML Probability Basis AML PB	MDL Probability Basis MDL PB	Number of Samples Per month MDL PB
Ammonia (May-Oct)	0.66	0.65	3.099	2.39	**3.4**	**8.9**	0.95	0.99	9
Ammonia (Nov-Apr)	0.61	1.1	5.95	3.61	**4.9**	**12.4**	0.95	0.99	9

CHLORINE PERMIT LIMIT CALCULATIONS BASED ON A NORMAL
DISTRIBUTION FOR DAILY MAXIMUM AND MONTHLY AVERAGE RESPECTIVELY,
USING 34 MONTHS OF DATA

	Daily maximum		Monthly average						
	sd	LTA	sd	LTA	AML	MDL	AML PB	MDL PB	MDL PB
Chlorine	0.11	0.45	0.087	0.35	**0.49**	**0.71**	0.95	0.99	30

COPPER AND ZINC PERMIT LIMIT CALCULATIONS BASED
ON LOGNORMAL DISTIRBUTION, LESS THAN 10 SAMPLES
ALL ABOVE THE DETECTION LIMIT

Parameter	sd	LTA	sd(n)	LTA(n)	AML	MDL	AML PB	MDL PB	MDL PB
Copper	0.12	3.79	0.061	3.79	**48.9**	**58.5**	0.95	0.99	4
Zinc	0.25	3.66	0.128	3.69	**49.4**	**69.5**	0.95	0.99	4

MERCURY AND ARSENIC PERMIT LIMIT CALCULATIONS ARE BASED ON
DELTA -LOGNORMAL DISTRIBUTION, LESS THAN 10 SAMPLES, SOME BELOW
DETECTION LIMIT. COMPLIANCE LIMIT SET AT QUANTIFICATION LEVEL

Parameter	sd	LTA	sd(n)	LTA(n)	AML	MDL	Compliance Limit	AML PB	MDL PB	MDL PB
Mercury	1.54	-1.57	0.994	-1.22	**1.1**	**4.9**		0.91	0.98	4
Arsenic	0.24	0.17	0.229	0.13	**1.6**	**2.1**	5.0	0.93	0.99	4

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DRAFT

Issuance Date: _____
Effective Date: _____
Expiration Date: _____

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-8711

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

City of Olympia and Contributing Jurisdictions (LOTT)
8th Avenue and Plum Street
Olympia, WA 98507

Plant Location: North Adams & East "A", Olympia
Thurston County

Receiving Water: Budd Inlet
South Puget Sound

Waterway Segment Number: 06-13-03

Discharge Location:

Water Body I.D. No.: WA-13-0030

001 North Outfall

Plant Type: Municipal - Activated Sludge

Latitude: 47° 03' 34"
Longitude: 122° 54' 16"

002 Fiddlehead

Latitude: 47° 03' 04"
Longitude: 122° 54' 14"

Olympia is the primary Permittee and is responsible for the treatment plant and all permit conditions except as otherwise noted. The Cities of Lacey and Tumwater and Thurston County are contributing jurisdictions responsible for issues involving the operation and maintenance of their respective collection systems and lift stations and the discharge of wastes from their systems to the LOTT Wastewater Treatment, as noted in the permit under Special Condition S18. All Permittees are responsible for compliance requirements under Special Condition S19, and General Conditions G1-G17, relating to their facilities as identified above.

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is authorized to discharge in accordance with
the special and general conditions which follow.

_____
William H. Backous, P.E.
Section Supervisor Water Quality Program
Southwest Regional Office

SUMMARY OF SUBMITTALS

Permit Section	Submittal	Frequency	First Submittal Date
S3.	Discharge Monitoring Report	Monthly	15th day of month following completed reporting period
S4.B.	Plan for Maintaining Adequate Capacity	As necessary	
S4.D.	Infiltration and Inflow Evaluation	Annual	May 15, 1994
S4.E.	Annual Assessment of Flow and Waste Load	Annual	May 15, 1994
S5.B.	O&M Manual Process Control Monitoring Schedule	1/permit cycle	December 3, 1993
S7.D.	Solids Management Plan	1/permit cycle	February 1, 1994
S7.D.	Solids Management Plan Update	1/permit cycle	180 days prior to expiration date
S9.	Acute Biomonitoring Study (Effluent)	Every other month for one year, subject to readjustment after one year	August 1, 1994
S10.	Chronic Biomonitoring Study (Effluent)	Every other month for one year, subject to readjustment after one year	August 1, 1994
S11.A.	Site-Specific Baseline Study Plan (Sediment)	1/permit cycle	June 1, 1994
S11.A.	Chemical Analysis of the Sediment	1/permit cycle	September 1, 1995
S11.A.	Biological Testing	Once if determined necessary	February 1, 1996
S12.B.	Combined Sewer Overflow Report	Annual	May 15, 1994

S12.C.	CSO Reduction Status Report	1/permit cycle	180 days prior to expiration
S13.	Outfall Evaluation	Annual	September 1, 1995
S14.	Spill Plan	1/permit cycle	6 months after permit issuance
S14.C.	Spill Plan Update	Annual	180 days prior to expiration date
S15.	Formal Adopted Agreement Identifying I/I Standards	1/permit cycle	June 30, 1993
S15.	Draft I/I Study	1/permit cycle	January 1, 1994
S15.	Final Adopted I/I Reduction Program	1/permit cycle	January 1, 1995
S16.	Fiddlehead Discharge Point Engineering Evaluation	1/permit cycle	January 1, 1996
S17.	Receiving Water Monitoring	Annual	May 15, 1994
S18.	Unauthorized Discharges Report	As necessary	
S19.	General Sewer Plan Update	1/permit cycle	Within 90 days of permit issuance
G4.	Non-Compliance Notification	As necessary	
G11.	Engineering Plans	As necessary	
G17.	Application for Permit Renewal	1/permit cycle	180 days prior to expiration date

SPECIAL CONDITIONS

S1. EFFLUENT LIMITATIONS

A. PRESENT EFFLUENT LIMITATIONS

Beginning on the effective date of this permit and lasting until Ecology formally accepts a "Declaration of Construction of Water Pollution Control Facilities" (due May 31, 1994) certifying completion of construction of the advanced wastewater facilities, the Permittee is authorized to discharge in accordance with the following effluent limitations:

Parameter	EFFLUENT LIMITATIONS[a] Monthly Average	Weekly Average
Biochemical Oxygen Demand[b] (5 day)	30 mg/l, 4000 lbs/day	45 mg/l, 6000 lbs/day
Total Suspended Solids[b]	30 mg/l, 4000 lbs/day	45 mg/l, 6000 lbs/day
Fecal Coliform Bacteria	200/100 ml	400/100 ml
pH	shall not be outside the range 6.0 to 9.0	

[a]The monthly and weekly averages are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.

[b]The monthly average effluent concentration for BOD5 and Total Suspended Solids shall not exceed 30 mg/l or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.

Total available (residual) chlorine shall be maintained which is sufficient to attain the fecal coliform limits specified above. Chlorine concentrations in excess of that necessary to reliably achieve these limits shall be avoided.

B. FUTURE EFFLUENT LIMITATIONS

Beginning upon formal Ecology acceptance of a "Declaration of Construction of Water Pollution Control Facilities" (due May 31, 1994) certifying completion of construction of the advanced wastewater facilities, the Permittee is authorized the discharge in accordance with the following effluent limitations:

The monthly average quantity of effluent discharged shall not exceed 22 mgd.

Parameter	EFFLUENT LIMITATIONS[a] Monthly Average	Weekly Average
Biochemical Oxygen Demand[b] (5 day)	30 mg/l, 5504 lbs/day 85% removal of influent concentration	45 mg/l, 8256 lbs/day
Total Suspended Solids[b]	30 mg/l, 5265 lbs/day 85% removal of influent concentration	45 mg/l, 7898 lbs/day
Fecal Coliform Bacteria	200/100 ml	400/100 ml
pH	shall not be outside the range 6.0 to 9.0	

	Monthly Average	Daily Maximum
Total Inorganic Nitrogen (TIN)[c]	4.0 mg/L	
North Outfall - Total Ammonia (as N)[d]	26 mg/L	36 mg/L
Fiddlehead Outfall - Total Ammonia (as N)[d]	22 mg/L	31 mg/L
Fiddlehead Outfall - Total Recoverable Copper	6.0 µg/L	7.5 µg/L

[a]The monthly and weekly averages are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.

[b]The monthly average effluent concentration for BOD5 and Total Suspended Solids shall not exceed 30 mg/l or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.

[c]The TIN limit shall be a seasonal limit and shall apply from April 1 through October 31.

[d]The total ammonia limit is a seasonal limit and shall apply from November 1 through March 31.

C. MIXING ZONE DESCRIPTIONS

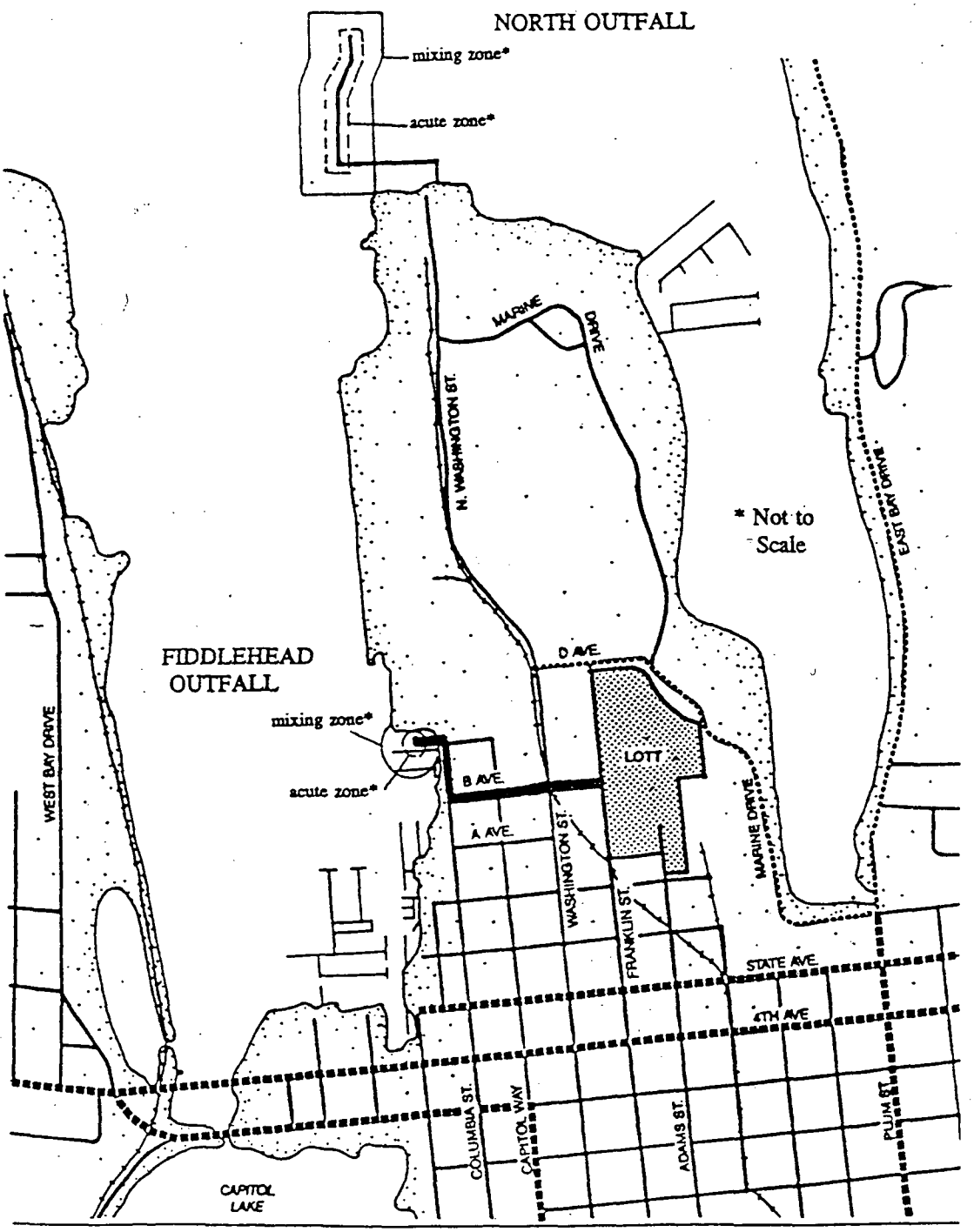
The maximum boundaries of the mixing zones are defined as follows:

North Outfall:

The mixing zone extends 213.5 feet from the last discharge port at both ends of the diffuser section and 215 feet from the centerline of the diffuser section. The acute zone extends 21.4 feet from the ends of the diffuser and 21.5 feet from the centerline of the diffuser pipe. A schematic follows.

Fiddlehead Outfall:

The mixing zone consists of that portion of a 201 foot circle centered over the ~~diffuser~~ discharge point, that does not impinge upon the shoreline. The acute zone extends 20.1 feet in a circle centered over the diffuser. A schematic follows.


NORTH OUTFALL
mixing zone*
acute zone*
MARINE DRIVE
N. WASHINGTON ST.
* Not to Scale
EAST BAY DRIVE
FIDDLEHEAD OUTFALL
mixing zone*
acute zone*
D AVE.
B AVE.
A AVE.
LOTT
WEST BAY DRIVE
WASHINGTON ST.
FRANKLIN ST.
MARINE DRIVE
STATE AVE.
4TH AVE
COLUMBIA ST.
CAPITOL WAY
ADAMS ST.
PLUM ST.
CAPITOL LAKE

S2. TESTING SCHEDULE

A. Wastewater

The Permittee shall monitor the wastewater according to the following schedule:

TESTS	SAMPLE POINT	FREQUENCY	TYPE
Flow, mgd	influent	daily	Continuous & Recording
pH	influent	daily	grab
	final effluent	daily	grab
BOD5	influent	daily	24-hr composite
	final effluent	daily	24-hr composite
TSS	influent	daily	24-hr composite
	final effluent	daily	24-hr composite
Fecal Coliforms	final effluent	daily	grab[1]
Temperature	Final Effluent	daily	grab
Ammonia as N	Influent & Effluent	5/week[2]	24-hr composite
		1/week[2]	24-hr composite
Nitrate/Nitrite as N	Influent & Effluent	5/week[2]	24-hr composite
		1/week[2]	24-hr composite
TKN	Influent	Weekly	grab
	Effluent	Weekly	grab
Metals[3]	Effluent	Monthly	24-hr composite
Total Available Chlorine Residual	Final Effluent	Daily[4]	grab
Whole Effluent Toxicity	Final Effluent	Per Conditions S9 & S10	24-hr composite
Priority Pollutant Analysis[5]:			
Metals[6]	influent	2/year	24-hr composite
	effluent	2/year	24-hr composite

Volatiles[7]	influent	2/year	grab
	effluent	2/year	grab
Priority Pollutant Organics[8]	influent	2/year	24-hr composite
	effluent	2/year	24-hr composite

[1] The fecal coliform sample shall be sampled concurrently with the chlorine residual sample.

[2] Sampling shall occur 5/week during the period of April through October. Sampling shall occur 1/week during the period November through March.

[3] Metals (Total Recoverable) for effluent include copper, lead, nickel, silver and zinc. Methods of analysis shall be EPA approved methods and shall achieve detection limits.

[4] Chlorine residual testing shall only be conducted until the ultraviolet disinfection process is on line and the chlorine process is abandoned. Following abandonment chlorine shall not be used at the facility, for disinfection or for plant maintenance, without the permission of the Department.

[5] If possible the priority pollutant analysis samples shall be collected at the same time as samples are collected for Whole Effluent Toxicity testing. All samples shall be taken when representative industrial flow is present, one sample during a low flow period and one sample during a high flow rate period, spaced four to eight months apart. Allow for Hydraulic Detention Time between influent and effluent samples if it is calculated to be less than 24 hours, otherwise no delay is required.

[6] Metals shall include: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, thallium, and zinc. Methods of analysis shall be EPA approved methods and shall achieve detection limits.

[7] Volatiles shall include: cyanide, oil and grease, phenols, sulfide, and volatile organics.

[8] Priority Pollutant Organics shall include: Acid Extractables, Base Neutrals, Pesticides, Polychlorinated Biphenyls.

May 7, 1993

FACT SHEET
for
Draft NPDES Permit No. WA-003706-1
LOTT Wastewater Treatment Facility
City of Olympia, Washington
Thurston County

PUBLIC NOTICE INFORMATION

The City of Olympia has applied for renewal of National Discharge Elimination System (NPDES) Permit No. WA-003706-1 issued by the Washington State Department of Ecology allowing discharge to surface waters of the State of Washington.

Ecology has drafted a permit and tentatively determined to issue this permit to the Permittee for a five-year term subject to certain effluent limitations and other conditions necessary to carry out the provisions of state and federal law. Ecology will send a copy of the draft permit and fact sheet to any party upon request. The application and related documents are also available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays at the regional office listed below.

Upon receipt of this fact sheet and the accompanying draft permit, notice will be published by the Permittee informing the public of Ecology's determination. Ecology will provide a period of not less than 30 days following the date of publication for interested parties to submit written comments regarding the draft permit determination. Ecology will retain and consider all written comments submitted during the 30-day period in formulating a final determination to issue, revise or deny the permit. Ecology may extend the period for comment at its discretion.

The applicant or any affected party may request a public hearing regarding the draft permit determination. A request for a public hearing shall be filed within the 30-day comment period, and shall indicate the interest of the party filing the request and the reasons why the hearing is warranted. Ecology will hold a hearing if it determines there is significant public interest or that useful information should be produced thereby. Public notice regarding any hearing will be circulated at least 30 days in advance of the hearing.

Written comments should be routed to:

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
Post Office Box 47775
Olympia, Washington 98504-7775.

Further information may be obtained from Ecology by telephone, (206) 586-5570, or by writing to the address listed above.

ATTACHMENT 16

DETERMINATION OF REASONABLE POTENTIAL FOR EXCURSIONS ABOVE AMBIENT CRITERIA

LOTT Effluent Data

Heavy Metals, and Chlorine (micrograms/L)

	Chromium	Nickel	Lead	Silver	Cadmium*	Copper	Arsenic	Selenium	Zinc	Chlorine
Limit of Detection	1.83	9.04	7.98	0.045	34/4.45	7.26	0.691	1.79	39	
Acute Criteria	1100	71.3	151.1	1.2	37.2	2.5	69	300	85	13
Chronic Criteria	50	7.9	5.8		8		36	71	77	7.5
1/1/91										260
2/1/91										230
3/1/91										250
4/1/91										250
5/1/91										280
6/1/91										260
7/1/91										270
8/1/91										310
9/1/91										310
10/1/91										250
11/1/91										230
12/1/91										200
1/1/92	1.83	10.7	7.98	0.87	34	17.2	1.4	1.79	80	220
2/1/92	1.83	9.6	7.98	0.4	34	12.7	1.4	1.79	87	180
3/1/92	1.83	10.4	7.98	0.16	34	14.8	1.5	1.79	62	200
4/1/92	1.83	11.3	7.98	0.89	34	19.3	1.4	1.79	84	210
5/1/92	1.83	9.04	43.9	1.85	4.45	7.26	1.2	1.79	75	220
6/1/92	1.83	17.7	43.6	0.79	4.45	12	1	1.79	85	230
7/1/92	1.83	9.04	86.3	0.7	4.45	16	1	1.79	53	180
8/1/92	1.83	36.6	20.5	0.14	4.45	25	1.3	1.79	39	220
9/1/92	1.83	27.7	20.7	1.44	20.2	12	0.691		47	160
10/1/92										120
11/1/92	1.83	26.7	24.8	1.4	4.45	19	0.691		43	170
12/1/92	1.83	9.04	16.4	1.93	4.45	24	0.691		89	220
Maximum	1.83	36.6	86.3	1.93	20.2	25	1.5	1.79	89	310
Average	1.83	16.17	26.19	0.96	6.7	16.30	1.12	1.79	68	226.25
Standard Deviation		9.73	23.91	0.62	5.95	5.35	0.32		19	45.57
Coefficient of Variation		0.60	0.91	0.65	0.6	0.33	0.28		0.3	0.20
Number of Data Points	11	11	11	11	7	11	11	10	11	24
Reasonable Potential		1.7	2.1	1.75	2	1.33			1.3	1.1
Multiplying Factor										
North Outfall Acute		3.40	9.90	0.18	2.21	1.82			6.3	18.63
North Outfall Chronic		2.96	8.63	0.16	1.92	1.58			5.5	16.24
Fiddlehead Outfall Acute		20.74	60.41	1.13	13.47	11.08			39	113.67
Acute Criteria	1100	71.3	151.1	1.2	37.2	2.5	69	300	85	13
Chronic Criteria	50	7.9	5.8		8		36	71	77	7.5

* Statistical data for cadmium are calculated for data from May 1992 through December 1992.

**Data shown at level of detection in the table are actually at some level less than the level of detection.

ATTACHMENT 16

DETERMINATION OF REASONABLE POTENTIAL FOR EXCURSIONS ABOVE AMBIENT CRITERIA

Assumptions:	North Outfall Acute Dilution =	18.3
	North Outfall Chronic Dilution =	21
	Fiddlehead Outfall Acute Dilution =	3
	The coefficient of variation is calculated from the data where the number of samples exceeds 10, otherwise it is assumed to be .6.	
	The upper bound of the effluent distribution is the 95 percentile. The confidence level is 95%.	
	The reasonable potential multiplying factor is obtained from Table 3-2 from the referenced EPA TSD.	
	The value that exceeds the the 95th percentile of the distribution after dilution is equal to the Maximum Value (Reasonable Potential Multiplying Factor) / Dilution. These values are represented in the above table as North Outfall acute, North Outfall Chronic, and Fiddlehead Outfall Acute.	
Conclusions:	Because the effluent data are so low for chromium, arsenic, and selenium there is no reasonable potential to exceed the water quality criteria.	
	With the exception of copper and chlorine, the calculated values are less than the acute and chronic water quality criteria so there is no reasonable potential for this effluent to cause an excursion above water quality standards.	
	There is a reasonable potential for chlorine to exceed the water quality criteria at both discharge points and potential for copper levels to exceed criteria at the Fiddlehead discharge point.	
	The analysis does indicate the continued need to monitor the effluent for copper, nickel, lead, zinc, and silver.	
References:	US EPA ; Technical Support Document For Water Quality -Based Toxics Control; EPA/505/2-90-001; PB91-127415; March 1991	
	City of Olympia, Department of Public Works; Final Effluent Metal Analysis, Yearly Report	
	Department of Ecology , Water Quality Program Permit Writer's Manual ; October 1992	

2. Dilution Factors:

North Outfall

The dilution factors for the acute and chronic zones were obtained from dilution modeling run by LOTT's consultant engineers. Two models were used, UDKHDEN and UMERGE. UDKHDEN was the most conservative. Attachment 14 is the model output for the North outfall. Minimum predicted dilution at 55 MGD (peak capacity) at MLLW (13.5 ft.) and at maximum stratification was 21. Dilution at the acute zone was approximated by extrapolation and was estimated to be 18.3.

Fiddlehead Outfall

The dilution factors for the Fiddlehead outfall were obtained from dilution modeling run by Ecology's Environmental Investigation's Unit (EILS). Attachment 15 describes the models and conditions used. The Fiddlehead discharge will be an intermittent discharge following completion of the hydraulic improvements. When a discharge occurs it still must meet acute water quality criteria, since acute criteria are based on a 1-hour average concentration not to be exceeded more than once every three years on average.

The dilution factor used for the Fiddlehead outfall acute zone is 3.

3. Water Quality Based Limits for Specific Parameters:

Water quality based permit limits are established for those parameters which exceed or have the potential to exceed water quality standards at the boundaries of the authorized mixing zone.

a. Metals

Heavy metals are present in the effluent. Attachment 16 includes an analysis of the potential for those parameters to exceed water quality criteria. Copper was shown to have the potential to exceed water quality criteria at the Fiddlehead discharge point. A limit will be included in the permit for the Fiddlehead discharge point, with a compliance schedule to achieve permit compliance. Attachment 17 is a copy of the output of the EPA provided model determining the limits for copper at the Fiddlehead discharge point. The analysis does indicate the need for continued monitoring of the effluent for copper, nickel, lead, silver, and zinc.

LOTT has several options to come into compliance with this requirement. LOTT may choose to modify the

existing North line such that all flows are discharged at this point. LOTT may choose to modify the Fiddlehead discharge point such that the dilution is increased and copper limits can be met. LOTT may also choose to evaluate the actual dilution available at the Fiddlehead site by performing an effluent mixing study to field verify the model predictions. In addition, LOTT may also choose to evaluate the dissolved versus total metals question as discussed below.

The ambient criteria for metals is based on the dissolved fraction of the metal. Ecology is required to apply the criteria as total recoverable values to calculate effluent limits unless data is made available to clearly demonstrate the seasonal partitioning of the dissolved metal in the ambient water in relation to the discharge. Metals criteria may be adjusted on a site-specific basis when data is made available clearly demonstrating the effective use of the water effects ratio approach established by USEPA. This approach is generally guided by the procedures in USEPA Water Quality Standards Handbook, December 1983, as supplemented or replaced.

b. Ammonia

Ammonia is currently present in the effluent at levels indicated in Attachment 9. A portion of the nitrogen will be removed when the facility has completed construction of advanced treatment facilities. Nitrogen removal is being required because of its nutrient properties not because of its toxic properties. Removal is only being required during April through October when its has an impact as a nutrient. The toxic properties of ammonia must also be evaluated.

In order to evaluate ammonia's toxic properties it is necessary to have receiving water information. Ecology's Budd Inlet Station 002 historical data was used to determine the reasonable potential for ammonia excursions above ambient criteria. This data exists for the period 1978 through 1993. Using the available data and Hampsons spreadsheet model the critical conditions were determined and as a result the acute and chronic condition were determined for the discharge location. Only the unionized portion of ammonia is toxic. The unionized portion of ammonia is dependant on the temperature, salinity, and pH of the receiving water. Hampsons model calculates what percentage of the ammonia is in the unionized form. The spreadsheet then calculates the site specific acute and chronic criteria.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DRAFT

Issuance Date: _____
Effective Date: _____
Expiration Date: _____

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

The State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-7775

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

authorizes

Kalama Chemical, Incorporated
1296 Third Street NW
Kalama, Washington 98625-9799

Facility Location:	Receiving Water:
1296 Third Street NW Kalama, Washington	Columbia River @ Mile 74
Industry Type:	Discharge Location:
Organic Chemicals Manufacturing	Latitude: 46° 01' 18" N Longitude: 120° 51' 35" W

to discharge in accordance with the special and general conditions which follow.

William H. Backous, P.E.
Southwest Region Supervisor
Water Quality Programs
Washington State Department of Ecology

FACT SHEET
AND
STATEMENT OF BASIS
FOR DRAFT PERMIT

Permit Type:	National Pollutant Discharge Elimination System (NPDES)
Permit Applicant:	Kalama Chemical, Inc. 1296 Third Street NW Kalama, WA 98625-9799
Permitting Authority:	Department of Ecology Southwest Regional Office P.O. Box 47775 Olympia, WA 98504-7775
Permit Writer:	Norman K. Schenck, P.E.

The permitting authority has made a tentative decision to issue a new discharge permit with respect to application by the above-named applicant for the discharge of pollutants to surface waters in connection with it's organic chemicals manufacturing and ground water remediation activities at Kalama, Washington. Authority is given to the Department of Ecology to issue NPDES permits, along with the obligation to specify in them "conditions necessary to prevent and control waste discharges into waters of the state." Ecology must issue a permit unless it finds that the discharge as proposed in the application will pollute the waters of the state in violation of the public policy declared in RCW 90.48.010.

The purpose of this document is to present the facts on the basis of which a decision to issue the permit was made, and to explain the basis for the permit limits and conditions. The fact sheet is intended to accompany the draft permit.

Interested persons are invited to comment on this tentative decision. Comments on the draft permit will be received for a period of 30 days follwing publication of the notice. All written comments submitted during the comment period will be retained by the permitting authority and considered in making the final decision on the application for a permit. The permitting authority will provide copies of the application, the draft permit and the fact sheet on request. Persons who submit written comments will be notified of the final decision.

The applicant or anyone affected by or interested in the decision may request a public hearing. The request must be filed within the 30-day comment period, and must indicate the interest of the party filing such a request and the reasons why a hearing is warranted. The permitting authority will hold a public hearing if it determines there is sufficient public interest.

Please submit written comments to the permitting authority at the above address, to the attention of Permit Coordinator.

BACKGROUND INFORMATION

Reason for Permit Application

State and federal laws require National Pollutant Discharge Elimination System permits for the discharge of pollutants to surface waters. The maximum allowable term for NPDES permits is five years. The applicant's current permit, issued in December of 1990, expires in December of 1995. Coincidentally, proposed new sources of discharge will be changing the quantity and quality of the pollutants in the discharge.

Nature of Industrial Activity

Kalama Cemical, Inc. operates an organic chemical manufacturing plant located adjacent to the Columbia River at Kalama, Washington. Constructed in the early 1960's, the plant originally produced phenol and other materials for the plywood industry. The plant has expanded since then to produce other chemicals including nonyl phenol, benzaldehyde, benzyl alcohol, sodium benzoate, potassium benzoate, benzylamine, dibenzylamine, fragrance aldehydes and plasticizers. The food, flavor/fragrance and pharmaceutical markets use most of the chemical compounds that KCI presently produces. Total annual production is on the order of 160,000,000 pounds.

Sources of Discharge

The primary activity which is the source of discharge for which application has been made is the manufacture of a variety of organic chemicals from the base chemical, toluene. This discharge consists of process wastewater (including associated storm water) and cooling water from various manufacturing processes. A secondary activity which will contribute significantly to the discharge during this permit term is the remediation of ground water contaminated from past practices at the site. This contaminated ground water, which is similar in character to the process water, will receive aerobic biological treatment with the process water prior to discharge. The "non-contact" cooling water, which is taken from and returned to the river, receives no treatment prior to discharge. The treated wastewater and the cooling water are combined and discharged from one outfall.

The Receiving Water

The Columbia River at the point of discharge is designated as a "Class A" fresh water body for the purposes of the application of state water quality standards. Characteristic and designated uses for Class A waters include: water supply (domestic, industrial, agricultural), stock watering, fish migration, fish and shellfish rearing, spawning and harvesting, wildlife habitat, primary contact recreation, sport fishing, boating and aesthetic enjoyment, commerce and navigation.

Current Permit vs. Draft Permit

The current permit applies the federal categorical effluent limits (Code of Federal Regulations, Title 40, Part 414, Organic Chemicals, Plastics and Synthetic Fibers) to the process wastewater discharge. These include "best practible control technology currently available" (BPT) limits on biochemical oxygen demand (BOD), total suspended solids (TSS) and pH plus "best available technology

economically achievable" (BAT) limits on 62 toxic pollutants. Exceptions are, in the case of copper, limits more stringent than the categorical limits are applied, based on past performance (or actual past discharge data) and no limits were placed on the categorical toxics chromium, lead and cyanide. In addition to these categorical limitations, limits are placed on the discharge of ammonia and phosphorus (which are added to the wastestream as biological nutrients for the treatment process) and on flow, oil&grease, total phenols, magnesium, cobalt, arsenic, cadmium and tin. There is no sound basis given for any of these additional limitations. No water quality impact evaluation of any of the limits was made and there are no specific water quality based limits (only a general statement that "water quality criteria shall not be violated outside of the boundary of a mixing zone"). Conditions in the current permit do call for providing information during the term of the permit which can be used to assess potential water quality impacts in future permit determinations.

The discharge for which permission is being requested is the same discharge which is now permitted, with some increase in the volume of process wastewater discharge due to projected production expansions, plus a substantial new flow from a contaminated ground water remediation activity mandated by EPA. This flow will be treated with the existing process wastewater treatment system which is being expanded to accommodate it. This proposal and the design basis for the treatment system expansion has been approved by the Department of Ecology, as required by WAC 173-240.

The new permit effluent limits must take into consideration the categorical, technology-based effluent limitations, plus qualitative information on the existing discharge, qualitative information on the ground water which is to undergo remediation, predicted treatment efficiencies for ground water constituents of concern and receiving water impacts of the discharge of all contaminants *vis a vis* receiving water quality standards.

Discharge Constituents and Quantities

The applicant has applied for permission to discharge up to 190 gpm of wastewater associated with the manufacturing processes (including 65 gpm of stormwater runoff associated with these manufacturing processes), 150 gpm of flow from remediation of contaminated groundwater and 43,000,000 gallons per day of non-contact cooling water.

Process Wastewater and Associated Storm Water:
Application requirements call for testing of existing process wastewater discharges for specific pollutants of concern, including, for this industry, all toxic metals, cyanide, total phenols and all GC/MS fractions of the "priority pollutant" list of organic toxic pollutants. The following table summarizes the qualitative data on the existing process wastewater discharge, after treatment, as provided in the application. Substances (in the above groups) not listed in Table 1 were undetected (at the method detection limit) in the discharge sampling. Temperature data is for the whole discharge from Outfall #001 (includes cooling water). Units are milligrams per liter (mg/L) except flow rate, pH, color and temperature.

TABLE 1

Parameter	Analytical Measurements (Maximum Day)	(Maximum 30 Day)	No. of Samples
Flow Rate	0.207 MGD	0.187 MGD	365

Biochemical Oxygen Demand	11	7	365
Chemical Oxygen Demand	456	123	365
Total Organic Carbon	45		365
pH range	6.3 - 9.0		80
Total Suspended solids	19	8	365
Ammonia (as N)	21	7	51
Temperature (Nov. - April)	31.7C	25.4C	182
Temperature (May - Oct.)	35.6C	32.1C	183
Color	20		1
Fecal Coliform	(waived)		
Oil & Grease	9 (once)	<5	200
Nitrate	24		1
Total Organic Nitrogen	2.8		1
Phosphorus	0.47		1
Sulphate	17		1
Cobalt	0.22		1
Iron	0.25		1
Magnesium	16		1
Manganese	0.016		1
Tin	0.1		1
Arsenic	<.100	<.025	6
Lead	.030	<.020	6
Zinc	0.024	.011	80
Copper	.087	.060	80
Nickel	.060	.030	80
Selenium	<100		1
Thallium	<100		1
Cyanide	.021	.021	20
Phenol	.020	.004	80
Bis(2-ethylhexyl)phthalate)	.002	.001	6

Remediated Ground Water:

Since it is only proposed, there is no actual information on the treated discharge from the ground water remediation activity. There is, however, from the site remediation investigations, information on the actual concentrations of contaminants in the ground water. This information, together with either site-specific or general information on the removal efficiency which can be expected with the on-site treatment process, is used in the following table to predict the ground water fraction effluent concentrations of the identified ground water constituents of concern. Concentrations are µg/L.

TABLE 2

Parameter	Detections/ No. Samples	Avg./Max. of Detections	Predicted Removal %	Predicted Effl. Conc.
Arsenic	112/172	[illegible]	50	10/70
Copper	71/172	110/1450	92	9/116
Lead	61/172	14/236	50	7/118
Nickel	45/172	46/255	60	18/102
Zinc	115/172	55/555	80	11/111
Benzene	76/172	4300/59000	99.9	4/59
Ethylbenzene	48/172	92		

Toluene	50/172	73000/610000	99.98	15/122
Pentachlorophenol	2/150	365/390		
Phenol	39/150	2400/38000	99.99	0.24/3.8
Bis(2-ethylhexyl)phthlalate	43/168	281	?	
Fluorene	8/165	17/23	?	
Naphthalene	10/165	141	?	

Cooling Water:

The cooling water is taken from the river and returned to the river with the only added constituent being heat. Seasonal maximum and average temperatures of this discharge are shown in Table 1.

BASIS FOR PERMIT CONDITIONS

General Requirements for Effluent Limitations

Technology Based Effluent Limitations:

The Federal Clean Water Act calls for achievement of certain "technology-based" limits on the discharge of pollutants to surface waters. Numerical limits have been established by EPA for certain categories of industries, the organic chemicals manufacturing industry being one. These limits are published in the Code of Federal Regulations and the applicable limits for the particular subcategories of organic chemicals produced at this facility are located at 40 CFR Part 414, Subparts F (Commodity Organic Chemicals), G (Bulk Organic Chemicals), H (Specialty Organic Chemicals) and I (Direct Discharge Point Sources that Use End-of-Pipe Biological Treatment. (These categorical limits are based on the the kind of wastewater treatment being applied at Kalama Chemical, so they should be achievable.) All the toxic pollutant effluent limitations and standards listed in Subpart I must be incorporated into the permit, even though most of them have never been detected by the monitoring which has been required in previous permits. These categorical technology-based limits are deemed to satisfy also the separate state law requirement that "all known available and reasonable methods of treatment" be applied prior to discharge of pollutants to waters of the state. In accordance with the guidelines, these limitations must be expressed in terms of mass discharge using "reasonable estimates" of associated flows to establish the limits. The process wastewater flow rate projected in the application will be used for these determinations, i.e.:

Process wastewater flow = 150 gallons per minute = 0.216 million gallons per day (mgd)

This includes an allowance for collected and treated surface runoff from the immediate process area of 25 gpm.

The ground water remediation activity for which permission to discharge has also been requested, has not been categorized or classed and has no established federal effluent guidelines. The establishment of technology-based limits is then, in accordance with federal regulations, left to the "best professional judgement of the permit writer". This is true also for the continuing cooling water discharge and for collected and treated storm water, not from the immediate process areas, but associated with industrial activity. The flow rates associated with these discharges are:

Remediated groundwater flow = 150 gallons per minute = 0.216 mgd

Storm water associated with industrial activity = 40 gallons per minute = .058 mgd

Cooling water flow = 17 mgd

Mass discharge limitations are calculated by multiplying the established concentration limit in mg/L times the estimated applicable flow (in mgd) times 8.34, a conversion factor which converts these units to lb/day.

Water Quality Based Effluent Limitations:

If any receiving water quality standards established by the state pursuant to the Clean Water Act could not be maintained through the implementation of technology-based limits, then limitations must be set on the discharge which *will* assure this. (Water quality criteria must be met regardless of whether or not there are technology-based limits, or what they are). The established water quality standards for waters of the State of Washington, including narrative as well as numerical criteria, are set out in Chapter 173-201A of the Washington Administrative Code and which incorporates the USEPA *Quality Criteria for Water - 1986*. EPA-developed human health criteria also apply (40 CFR Part 131). These water quality criteria, in general, are intended to maintain and protect or achieve the characteristic and designated uses of the receiving water. For substances toxic to aquatic life, criteria must be achieved within limited zones within the receiving water body and at critical, low-flow conditions. For other substances or parameters, criteria may be met after complete mixing with the receiving water and at flow conditions appropriate to the protection of the particular use which the contaminant would impact. For the purposes of assessing water quality impacts for this discharge, the following receiving water flows and dilution factors are used. (7Q10 = lowest 7-day average river flow with a 10-year recurrence interval: 30Q5 = lowest 30-day average flow with a 5-year recurrence interval.)

For conventional pollutant impacts (e.g., BOD):

Receiving water flow = 87,000 cfs (7Q10 derived from USGS records[1])

For aquatic life chronic toxicity impacts:

Dilution Factor = 21:1 (determined by dilution analysis approved by permit authority[2])

For aquatic life acute toxicity impacts:

Dilution Factor = 8:1 (determined by dilution analysis approved by permit authority[2])

For human health impacts (carcinogens):

Receiving water flow = 174,000 cfs (estimated harmonic mean flow = 2 x 7Q10)

For human health impacts (non-carcinogens):

Receiving water flow = 130,000 cfs (estimated 30Q5 flow = 1.5 x 7Q10)

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[1]U.S. Geological Survey Water Data Reports

[2]Beak Consultants, Incorporated, June 29, 1993

Basis for Specific Effluent Limitations

The following paragraphs provide the basis for the draft permit effluent limits, whether technology-based or water-quality-based, and for the specified monitoring requirements, or for the determination that no limits and/or monitoring are warranted. The need for limits was considered for all conventional and toxic pollutants for which there are categorical effluent limitations guidelines and for all identified "contaminants of interest" in the ground water for which there are either effluent guidelines or water quality criteria.

Biochemical Oxygen Demand:

The technology-based effluent limitations for 5-day BOD are somewhat different for each of the three categories of organic chemicals which apply to this activity. The BOD_5 limits are calculated, then, according to the relative proportion of the total production (in terms of mass) in the three categories.

According to supplemental information provided with the application, the anticipated mass production is approximately 16% commodity organics, 61% bulk organics and 23% specialty organics. The applicable daily maximum BOD_5 effluent limitations are 80, 92 and 120 mg/L, respectively, and the maximum monthly average limitations are 30, 34 and 45 mg/L, respectively. The composite technology-based effluent limits for BOD_5, then, are calculated as:

$$.16(80) + .61(92) + .23(120) = 13 + 56 + 28 = 97 \text{ mg/L (daily maximum)}$$

$$.16(30) + .61(34) + .23(45) = 5 + 21 + 10 = 36 \text{ mg/L (monthly average)}$$

for the flow attributable to process-associated wastewater.

The appropriate technology-based limitations for the ground water remediation portion of the flow and the collected storm water not from the immediate process areas are determined, in the best professional judgement of the permit writer, to be the projected average concentrations of these sources less the removal achievable by the in-place biological treatment system, which has been demonstrated to be 95%. The average measured BOD_5 concentration of both these sources is 280 mg/L, according to supplemental information submitted with the permit application. The effluent limitation, then, is calculated as:

$$280(1 - .95) = 14 \text{ mg/L}$$

for the flow attributable to the ground water remediation activity and stormwater associated with industrial activity.

The total discharge of BOD_5 from outfall #002, then, shall not exceed the quantity (mass) determined by multiplying the above-specified concentration limits times the pertinent flows and summing the products, i.e.:

$$\text{Maximum day mass discharge of } BOD_5 = [97(.216) + 14(.274)]8.34 = 206 \text{ lb/d}$$

$$\text{Max. monthly avg. mass discharge of } BOD_5 = [36(.216) + 20(.274)]8.34 = 78 \text{ lb/d.}$$

There is no receiving water quality standard for BOD, but BOD will directly impact dissolved oxygen

(DO), for which there *are* receiving water criteria. The applicable criterion in this case is that "dissolved oxygen shall exceed 90% of the saturation concentration". The saturation concentration is dependent on temperature, decreasing as temperature increases. The most critical condition could be assumed, then, to be at the time the river temperature is at its highest (saturation DO at its lowest). This is when the incremental reduction in DO which could cause a violation of the standard would be smallest and, at the same time, when the rate of exertion of BOD (depletion of DO) would be greatest.

The maximum temperature criterion for this reach of the Columbia River is 20 C, but actual temperature has reached 22 C, at which the saturation DO is 8.7 mg/L. The water quality criterion is, therefore, 8.7(.9) = 7.8 mg/L. Actual DO under these conditions was measured at 8.2 mg/L. The criterion, then, would essentially allow the discharge to reduce the stream DO by 0.4 mg/L and, therefore, the total reservoir of depletable oxygen available is:

0.4(87,000)(.646)(8.33) = 187,000 lb/d

The total oxygen demand of the discharge at the technology-based limits, conservatively assuming an ultimate carbonaceous BOD of 2 times the 5-day BOD, is:

206(2) = 412 lb/d

To this can be added the BOD to convert the maximum measured ammonia in the discharge to nitrate:

21(4.6)(.49)(8.34) = 400 lb/d

for a total of about 800 lb/d.

On this basis, the permitting authority has determined that discharges of BOD at the technology-based limits, plus ammonia at the maximum measured concentration, even without considering the natural reaeration of the river, will have no reasonable potential to cause or contribute to violations of the receiving water quality standards for dissolved oxygen.

Total Suspended Solids:

As for BOD, the technology-based limitations for TSS are different for the three categories of product (daily maximum: 149, 159 and 183, respectively and monthly average: 46, 49, and 57). Using the same methodology as for BOD, the composite TSS technology-based limits are calculated as:

.16(149) + .61(159) + .23(183) = 163 mg/L (daily maximum)

.16(46) + .61(49) + .23(57) = 50 mg/L (monthly average)

The total process wastewater mass discharge of TSS, then, shall not exceed the quantity determined by multiplying the above-determined concentrations times the pertinent flows, i.e.:

Maximum day mass discharge of TSS = 163(.216)(8.34) = 293 lb/d

Max. monthly avg. mass discharge of TSS = 50(.216)(8.34) = 90 lb/d.

There is expected to be no significant contribution of TSS from the ground water and the storm water

associated with industrial activity, so no allowance is given.

There are no water quality criteria for suspended solids.

pH:

The technology-based effluent limitations for pH are: "within the range of 6.0 to 9.0 at all times". The applicable receiving water quality criterion for pH is "within the range of 6.5 to 8.5 and no human-caused variation of more than 0.2 units". Given the magnitude of the discharge relative to the receiving water flow, there can be no doubt that the technology-based limits will assure no violation of the water quality standards for pH.

Temperature:

There are no categorical, technology-based effluent limitations for temperature. During the term of the current permit, a performance-based limit was developed and the permit was modified to incorporate this limit. At the same time, the permitting authority made a determination that the discharge at this performance-based limit would not have a reasonable potential to cause or contribute to violations of any of the applicable receiving water quality standards for temperature. Since the proposed discharge will have no significant change in this respect, this limit and water quality impact assessment are deemed valid for this draft permit.

Ammonia:

There are no categorical technology-based effluent limitations for ammonia. Ammonia is in the discharge probably only as surplus from the purposeful addition of ammonia to satisfy the nutritional needs of the biological treatment system. The current permit has established "informal", provisional limits of 30 mg/L maximum and 15 mg/L average, with provision to revise them on the basis of information acquired during the permit term.

The water quality criteria which protect against toxicity to aquatic life are the most stringent criteria for ammonia. The total ammonia concentration which would cause toxicity is pH- and temperature-dependent. In the range of extreme ambient conditions (pH=8.25, T=25), the acute and chronic toxicity criteria are 2.8 mg/L and 0.4 mg/L, respectively. According to the data, the maximum one-day concentration of total ammonia in the existing discharge from the treatment system has been 21 mg/L. The maximum for a monthly average is 7 mg/L and the long-term average has been 0.6 mg/L. This discharge mixes with the cooling water prior to discharge to the river. The cooling water is river water, and assuming ammonia concentration of .03 mg/L (based on USGS data), the combined discharge concentration prior to mixing and dilution can be calculated as:

$$c_{max} = [.49(21) + 17(.03)]/17.5 = 0.62 \text{ mg/L} \quad (< \text{acute criterion of } 2.8 \text{ mg/L})$$

$$c_{30\text{-day avg.}} = [.49(7) + 17(.03)]/17.5 = 0.23 \text{ mg/L} \quad (< \text{chronic criterion of } 0.4 \text{ mg/L})$$

On this basis, and because there is an economic disincentive for the discharger to add more ammonia than is needed, the permitting authority has determined that there is no reasonable potential for this discharge of ammonia to cause or contribute to violations of the water quality criteria for ammonia.

Ammonia is also a source of nitrogen, a nutrient for plant and algal growth which, if excessive, can

adversely impact water quality, or at least may violate the state narrative water quality criterion regarding aesthetics. This potential impact is evaluated under "*Nitrogen*". Ammonia as a source of oxygen demand has been accounted for under "*Biochemical Oxygen Demand*".

Nitrogen (Nitrate-N, Ammonia-N, Organic-N):

There are no categorical technology-based effluent limitations for nitrogen. Nitrogen is in the discharge probably only as surplus from the intentional addition of ammonia to satisfy the nutrient needs of the biological treatment system.

Nitrogen, in all its forms, is of interest because it is a plant nutrient, and in sufficient amounts and under the right circumstances, it could be the limiting factor contributing to nuisance plant growth, and this could be construed as a violation of the narrative water quality criterion that, "aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch or taste." There are no numeric water quality criteria for nitrogen as a nutrient. To evaluate this potential impact, it may be sufficient to say that this discharge would contribute less ammonia to the receiving water than the normal secondary-treated sewage from a town of 1000 people. No city of any size on the Columbia River is required to remove nitrogen as a nutrient. On this basis, and because there is an economic disincentive for the discharger to overuse ammonia, the permitting authority has determined that there is no reasonable potential for this discharge of nitrogen to cause or contribute to violations of the narrative water quality criteria regarding aesthetic values.

Phosphorus:

There are no categorical technology-based effluent limitations for phosphorus. Phosphorus is in the discharge probably only as surplus from the intentional addition of phosphorus to satisfy the nutrient needs of the biological treatment system. The current permit has established arbitrary limits of 8 mg/L maximum and 5 mg/L average (no basis was provided in the fact sheet).

Phosphorus is of interest because it is a plant nutrient, and in sufficient amounts and under the right circumstances, it could be the limiting factor contributing to nuisance plant growth, which could be construed as a violation of the narrative water quality criterion, that "aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch or taste."There are no established numeric water quality criteria for phosphorus but the USEPA *Criteria for Water Quality* recommends that phosphate not exceed 0.1 mg/L in streams to preclude such conditions. The available data on the discharge shows a total phosphorus concentration of 0.47 mg/L. Available data shows the receiving water concentration can be 0.05 mg/L. The incremental increase from this discharge in the river load of phosphorus, would be on the order of 1/25,000th and would not measurably increase the river concentration. This is considered an insignificant additional loading which would have no potential to cause or contribute to violations of the narrative standard or the recommended maximum 0.1 mg/L for streams. On this basis, no limits or monitoring requirements for phosphorus are placed in the draft permit.

Oil & Grease:

There are no categorical effluent guidelines nor water quality criteria for oil and grease. Considering that the installed treatment system is incidentally effective at controlling oil and grease (corroborated by

monitoring required in current permit: one detection in 200 samples), and that permit limitations on other parameters will assure efficient operation of the system, no limits or monitoring requirements for oil & grease are placed in this draft permit.

Chemical Oxygen Demand, Total Organic Carbon, Color, Nitrate, Total Organic Nitrogen, Sulfate, Cobalt, Iron, Magnesium, Manganese, Tin:

No effluent limits or monitoring requirements are placed in the draft permit on these Table 1 measured parameters because there is no applicable criterion.

Arsenic:

For reasons not explained in the fact sheet, monitoring of arsenic has been required in the current permit. The quarterly samplings have not detected (at a detection limit as low as 5 µg/L) arsenic in the existing discharge. There are no categorical, technology-based effluent limitations for arsenic. Arsenic *has* been detected in the ground water to be remediated, however. According to the ground water data, the average concentration of arsenic is 20 µg/L. The treatment process can be expected to remove 50% of arsenic, according to the EPA treatability database.

The water quality criteria which protect human health are the most stringent criteria for arsenic (0.018 µg/L for ingestion of water and organisms), but the receiving water contains 1 ppb (USGS data). According to the water quality standards, this "background" concentration becomes the criterion. To assess the potential of this discharge to cause or contribute to a violation of this criterion, then, the process water discharge will be assumed to contain 5 µg/L arsenic (the level at which it has not been detected in the existing discharge) and the treated ground water discharge will be assumed to contain 10 µg/L. The maximum arsenic loading may then be calculated as:

$$.005(0.274)(8.34) + .010(0.216)(8.34) = .0294 \text{ lb/d}$$

Assuming ambient arsenic concentration of 1 µg/L, the river load of arsenic at average flow is:

$$.001(192,000)(.646)(8.34) = 1000 \text{ lb/d}$$

On the basis that this is an insignificant addition to the ambient river loading which would cause no measurable increase over the upstream concentration (and therefore would not exceed the criterion), the permitting authority has determined that there is no reasonable potential for this discharge to cause or contribute in any significant way to violations of any applicable water quality criteria for arsenic. Therefore, no limits or monitoring requirements for arsenic are placed in the draft permit.

Copper:

There are categorical, technology-based effluent limitations for copper for this industrial activity, and copper has been measured in the wastestream (See Table 1). The applicable limitations are 3.38 mg/L (maximum for any one day) and 1.45 mg/L (maximum for monthly average) multiplied by the flow from copper-bearing wastestreams, only. The wastestream from the production of phenol by the liquid phase oxidation of benzoic acid is recognized by the federal effluent guidelines as a copper-bearing wastestream. The flow attributable to this wastestream, including allowable area washdown and storm runoff, is 20 gpm in the current permit. The draft permit technology-based limit for copper in the process wastewater is based on an anticipated increased production flow of 27 gpm (0.039 mgd).

The technology-based limitations for the ground water remediation portion of the flow are determined, in the best professional judgement of the permit writer, to be the average measured ground water concentration less the copper removal achievable by the in-place biological treatment system, which has been demonstrated to be 90%. The average measured ground water concentration is 0.110 mg/L, according to supplemental information submitted with the permit application. The effluent limitation, then, is calculated as:

$$0.110(1 - .90) = 0.01 \text{ mg/L}$$

for the flow attributable to the ground water remediation activity.

The total discharge of copper from outfall #002, then, shall not exceed the quantity (mass) determined by multiplying the above-specified concentration limits times the applicable estimated flows and summing the products, i.e.:

$$\text{Maximum day mass discharge of copper} = [3.38(.039) + 0.01(.216)]8.34 = 1.12 \text{ lb/d}$$

$$\text{Max. monthly avg. mass discharge of copper} = [1.45(.039) + 0.01(.216)]8.34 = 0.49 \text{ lb/d}$$

as measured at outfall #002 (the discharge from the treatment system).

There are receiving water quality standards, as well, for copper. In this case, the criteria which protect against toxicity to aquatic life are the most stringent. The total copper concentration which would cause toxicity is hardness-dependent. At minimum ambient hardness conditions in the receiving water (24 mg/L), the acute and chronic toxicity criteria are 5.0 µg/L and 0.9 µg/L, respectively. The ambient receiving water concentration of copper varies inversely with river flow and has been measured as high as 22 µg/L at low-flow conditions, more than four times the acute toxicity criterion, so there is no room for dilution in the receiving water, and the background concentration becomes the criterion per state water quality standards. The total load of copper in the river at this concentration and the 7Q10 river flow is:

$$.022(87,000)(.646)(8.33) = 10,300 \text{ lb/d}$$

The technology-based allowable discharge of 1.12 lb/d of copper would be an insignificant contribution to the total river load of over 5 tons, would not measurably increase the river concentration, and therefore would not exceed the criterion. On this basis, the permitting authority has determined that this discharge, in compliance with the applicable technology-based limits and having received all known available and reasonable treatment, would not cause or contribute in any significant or measurable way to violations of receiving water quality standards for copper.

(Furthermore, according to reported actual discharge data, the maximum one-day loading of total copper in the existing discharge from the treatment system has been 0.080 mg/L, 40 times less than the maximum technology-based limit of 3.38 mg/L).

Nickel:

There are categorical, technology-based effluent limitations for nickel for this industrial activity, and nickel has been measured in the wastestream (See Table 1). The applicable limitations are 3.98 mg/L

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DRAFT

Issuance Date: _____
Effective Date: _____
Expiration Date: _____

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-7775

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

Matsushita Semiconductor Corporation of America
1111 - 39th Avenue Southeast
Post Office Box 5000
Puyallup, Washington 98373-0900

Plant Location	Receiving Water
1111 - 39th Avenue Southeast	001 - Puyallup River Outfall
	002 - Puyallup River via Puyallup POTW
Puyallup, Washington	003 - Stormwater Retention Pond
Water Body I.D. No.:	Discharge Location
WA-10-1020	001 - Lat. 47° 12' 28" Long. 122° 19' 11"
Industry Type	002 - Lat. 47° 09' 45" Long. 122° 16' 53"
Semiconductor Manufacturing Integrated Circuits Fabrication	003 - Lat. 47° 09' 45" Long. 122° 16' 53"

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is authorized to discharge in accordance with
the special and general conditions which follow.

William H. Backous, Section Manager
Southwest Regional Office
Washington State Department of Ecology

FACT SHEET

This fact sheet is a companion document to the draft National Discharge Elimination System (NPDES) Permit No. WA-003957-8. The Department of Ecology (the Department) is proposing to reissue this permit, which will allow discharge of wastewater to waters of the State of Washington.

This fact sheet explains the nature of the proposed discharge, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for those decisions. Public involvement information is contained in Appendix A. Definitions are included in Appendix B.

GENERAL INFORMATION

Applicant:	Matsushita Semiconductor Corporation of America
Facility Name and Address:	Matsushita Semiconductor Corporation of America 1111 - 39th Avenue Southeast Post Office Box 5000 Puyallup, Washington 98373-0900
Type of Facility:	Semiconductor Manufacturing Integrated Circuits Fabrication
Discharge Location:	001 - Puyallup River via Puyallup POTW Outfall 002 - City of Puyallup Sanitary Sewer 003 - Storm Water Retention Pond 001 - Latitude: 47° 12' 28" N. Longitude: 122° 19' 11" W. 002 - Latitude: 47° 09' 45" N. Longitude: 122° 16' 53" W. 003 - Latitude: 47° 09' 45" N. Longitude: 122° 16' 53" W.
Water Body ID Number:	Puyallup River, 05-10-03
Permit writer:	Anise Ahmed/WQ/SWRO

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BACKGROUND INFORMATION

Description of the Receiving Water

Puyallup River is designated as a Class *A* receiving water in the vicinity of the outfall. Characteristic uses include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Description of the Facility

Matsushita Semiconductor Corporation of America (MASCA) owns and operates a semiconductor manufacturing facility in Puyallup, Washington. The facility was originally constructed and operated by Fairchild Camera and Instruments, Inc., and was purchased by National Semiconductor in 1987. The facility was purchased by Matsushita Semiconductor in February of 1991. Current production is 10,000 wafer-outs per month. Matsushita is proposing to increase production to 15,000 wafer outs per month by October, 1994; 20,000 wafer outs per month by October, 1995; 30,000 wafer outs per month by October, 1996; and 40,000 wafer outs per month by October, 1997.

Industrial Process

Bipolar integrated circuits are fabricated by processing silicon wafers through a series of photolithographic and etching steps. A layer of metal is deposited onto the surface of the wafer to provide contact points for final assembly. Most of these processes using heavy metals are "dry" processes with no contact water involved. Metals used in dry processes include gold, platinum, copper, aluminum, titanium, and tungsten. Chromic acid etch and antimony diffusion processes are used on some product lines. Wastes from these processes are hauled to Chemical Processors in Seattle, a hazardous waste treatment, storage and disposal facility. There are no discharges from processes using heavy metals.

There are numerous locations within the facility complex where oil and hazardous substances are received, stored, mixed, applied, or treated. These are regulated under federal and state dangerous waste regulations.

Discharge

Wastewater discharges result from treatment of intake water, cooling water, boiler blowdown, process wastewater, and storm water runoff. Most of the process water is ultra pure deionized water used to rinse wafers after acid etching. These acid wastewaters are collected and treated via precipitation, sedimentation, ammonia stripping, and pH adjustment prior to discharge. High biochemical oxygen demand (BOD) wastestreams resulting primarily from rinses following solvent application are isolated from the other process wastestreams and discharged after carbon adsorption pretreatment to the sanitary sewer system. There are three separate outfalls:

1. Outfall 001: Treated wastewater discharges directly to the Puyallup River via a six mile long, ductile iron dedicated tightline connected (by agreement) to the City of Puyallup's (Puyallup) wastewater treatment plant outfall pipe. Puyallup has the ability to intercept and store this discharge at the POTW. MASCA effluent includes treated process waters from wafer production (spent etchant, acid rinse water, fluoride/ phosphate/ammonia wastes), reverse osmosis (R.O.) reject water, Deionization (DI) regeneration water, and non-contact cooling water from "A" building.

2. Outfall 002: Boiler blowdown, non-contact cooling water blowdown from "C" building, untreated silica grindings and pretreated process water from the organic solvent rinses (high BOD wastestream) are discharged to the Puyallup POTW via sanitary sewer.

3. Outfall 003: Wastewater from the sand, carbon, and DI filter backwashes, and storm water runoff from parking lots and the facility's french drain system are discharged to an unlined storm water retention pond. The pond has good percolation and discharge is normally to ground. MASCA is not aware of any discharge occurring from pond overflow and overflow did not occur after the rainstorm of January 9, 1990, (a 100 year storm event). The filter backwashes were rerouted to the pond from the tightline in July of 1989 due to hydraulic overloading in the tightline. The backwash water contains a high concentration (180 mg/L) of suspended solids. Solids are also deposited from storm water runoff. The pond is periodically dredged.

Previous Permit Limitations

The previous permit for this facility was issued on June 27, 1991. The previous permit placed effluent limitations for various outfalls as listed in Table 1.

Table 1. Previous permit limits

Outfall	Parameter	Monthly Average	Daily Maximum
001	Flow	0.7 mgd	1.0 mgd
	pH	Between 6.0 and 9.0 standard units	
	BOD_5	15 mg/L, 88 lb/day	30 mg/L, 175 lb/day
	TSS	15 mg/L, 88 lb/day	30 mg/L, 175 lb/day
	Fluoride	16 mg/L, 93 lb/day	26 mg/L, 152 lb/day
	Phosphorus	3 mg/L, 18 lb/day	5 mg/L, 29 lb/day
	Ammonia	20 mg/L, 117 lb/day	32 mg/L, 187 lb/day
	TTO		1.37 mg/L
002	Flow	–	0.040 mgd
	TTO	–	1.37 mg/L
	pH	Within the range of 6-9 standard units	
003	Flow	N/A	No pond overflow permitted
	pH	Between 6.0 and 9.0 standard units	

Summary of Compliance with the Previous Permit

The facility last received an inspection on October 29, 1991. A Class 2 inspection has never been conducted for the site. Table 2 lists permit limit violations since the issuance date (June 27, 1991). Prior to January 1993, samples for BOD analyses were drawn from the Manning composite sampler in the concrete block monitoring building at Puyallup POTW. This practice has since been eliminated due to biological build-up in the line connecting the POTW weir and the monitoring building. This biological build-up has been blamed by MASCA for BOD excursions.

Table 2. Previous permit limit violations

Outfall	Date	pH min	pH max	Flow max MGD	NH3 max mg/L	BOD max mg/L	BOD max lbs/	BOD average mg/L	BOD average bs/d	TSS max mg/L	TSS max lbs/d	TSS average mg/L	TSS average lbs/	Fluoride max mg/L	Phosphorus max mg/L	Phosphorus average mg/L
1	Jun-91	6	9													
	Oct-91	4														
	Nov-91	5														
	Feb-92				35	32										
	Mar-92	6				37		19		44		18			6.6	3.9
	Apr-92		9			51	158	32	95.7							
	May-92	6	11			50		23				19				
	Jun-92		11					16				18				
	Aug-92		11							60		22				
	Sep-92											16				
	Nov-92	6	11			31		25	93.2	89	333	41	153	30	6.6	
	Dec-92		11							33				28		
	Apr-93	6														
	May-93	6						18		37						
	Jun-93		11					29								
	Jul-93	6						16		38						
	Aug-93	5	10			34		24								
	Sep-93		9													
Permit limit		**6**	**9**		**32**	**30**	**175**	**15**	**88**	**30**	**175**	**15**	**88**	**26**	**5**	**3**
2	Dec-91	3	10													
	Jan-92	4														
	Feb-92	4		0.049												
	Apr-92	5	10													
	May-92	3	10													
	Jun-92	3	9													
	Jul-92	3	11													
	Aug-92		10													
	Sep-92	3	12													
	Dec-92	2														
	Jun-93		12													
	Aug-93		10													
Permit limit		**6**	**9**	**0.04**												

Currently, an ISCO composite sampler has been placed at the concrete distribution box (POTW weir). BOD excursions are attributed to biological growth in the tightline (personal communication, Ed Barker, Matsushita, December 1, 1993). Mr. Barker informed Ecology that the BOD of the effluent leaving the treatment system is always below detection and that BOD of discharge at the sampling point (at Puyallup POTW) may be due to biological growth in the tightline. However, the BOD of the effluent tends to increase if sludge in the fluoride treatment system is not removed in a timely manner (Bob Frisbie, Dec 13, 1993, personal communication). This seems to be an operational problem and can be controlled.

A BOD reduction is experienced when the tightline is flushed with a high pH solution (perhaps destroying the biological mass). The high pH flow is then diverted to a tank (at the POTW) for pH adjustment before discharge. A high pH flushing was done in January of 1993, with subsequent reduction of BOD to 5 mg/L. If the BOD in effluent from treatment system is in fact, below detection level, the increased production may have minimal effect on BOD loadings. In the permit application, MASCA has proposed to maintain the current BOD mass loadings even at increased production levels. This would mean that BOD concentrations must be decreased as production is increased to maintain the same mass loading (see Table 3, outfall 001).

The pH excursions have been a chronic problem for both outfall 001 and 002. The POTW has provision to divert flow from outfall 001 to a holding tank when pH excursions occur. No such provisions are present for outfall 002.

Wastewater Characterization

An application for permit renewal was submitted to the Department on October 18, 1993. The application was reviewed by the Department and found to lack certain information. The application was returned to Matsushita on December 7, 1993. The application with the necessary information was later received (January 10, 1994) and accepted (January 19, 1994) by the Department. The maximum daily discharge as described in the NPDES Renewal Application 2C (and addendum to the application) and DMR data is characterized by the regulated parameters and pollutants of concern as shown in Table 3. During TMDL evaluation of Puyallup River, outfall 001 was also sampled and analyzed. Table 4 gives a summary of the data.

In addition to parameters contained in Table 3, outfall 002 also contains Sulfate(2.62 mg/L), Aluminum (0.411 mg/L), and Iron (0.566 mg/L). These concentrations are insignificant as far as effects on activated sludge process. Concentrations inhibitory to carbonaceous BOD removal in an activated sludge process are 15-26 ppm for Aluminum, and 1000 ppm for Iron. Inhibition of nitrification may occur at Sulfate concentration of 500 ppm.

Discharge at outfall 003 also contains low levels of fluoride (<2 mg/L), aluminum (0.071 mg/L), iron (0.407 mg/L), magnesium (1.93 mg/L), manganese (0.09 mg/L), zinc (0.616 mg/L) and total phenol (0.007 mg/L).

SEPA Compliance

In 1989, the facility expanded its capacity to 12,000 Wafer Starts per month. The proposed construction to facilitate this expansion had gone through the State Environmental Policy Act (SEPA) process which concluded with a determination of non significance (DNS). Any construction related to the proposed expansion of the facility to 40,000 Wafer-outs per month (by October, 1997, as indicated in the permit application) will comply with the SEPA process (Bob Frisbie, Matsushita Semiconductor, personal communications, Oct. 1993).

Table 3. Pollutants of concern and estimated loadings for proposed expansion.

Outfall	Parameter	Daily maximum at various Wafer-Outs per month				
		10K	15K	20K	30K	40K
001	Flow, mgd	0.7	0.85	1.00	1.3	1.6
	BOD_5, mg/L	30	25	21	16	13
	lbs/d	175[a]	175	175	175	175
	TSS, mg/L	30[b]	30	30	30	30
	lbs/d	175	213	250	325	400
	NH3-N, mg/L	25	25	25	25	25
	lbs/d	146	177	208.5	271	334
	Temp., °C					
	Winter	20	20	20	20	20
	Summer	22.5	22.5	22.5	22.5	22.5
	pH	——— Between 5.6 and 11.3 ———				
	TRCl, mg/L	<1	<1	<1	<1	<1
	Fluoride, mg/L	30	30	30	30	30
	lbs/d	175	213	250	325	400
002	Flow,mgd	0.038	0.045	0.051	0.064	0.076
	BOD_5, mg/L	48	48	48	48	48
	lbs/d	15.2	18	20.4	25.6	30.4
	TSS, mg/L	4	4	4	4	4
	lbs/d	1.27	1.5	1.7	2.1	2.5
	NH3-N, mg/L	0.48	0.48	0.48	0.48	0.48
	lbs/d	0.15	0.18	0.2	0.26	0.3
	TRCl, mg/L	<1	<1	<1	<1	<1
	Fluoride, mg/L	0.209	0.209	0.209	0.209	0.209
	lbs/d	0.066	0.078	0.089	0.11	0.13
	Temp., °C	20	20	20	20	20
	pH	——— Between 2.3 and 12.2 ———				
003	Flow,mgd	0.029	0.034	0.039	0.049	0.058
	BOD_5, mg/L	<2.0	<2.0	<2.0	<2.0	<2.0
	TSS, mg/L	16.5	16.5	16.5	16.5	16.5
	lbs/d	3.99	4.68	5.36	6.74	7.98
	NH3-N, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
	TRCl, mg/L	<1	<1	<1	<1	<1
	Temp., °C	20	20	20	20	20
	pH	——— Between 6 and 8.5 ———				

[a] BOD_5 mass loadings have been assumed to remain the same with increases in production to conform to the Puyallup River TMDL for BOD (MASCA permit application).

[b] TSS concentration is approximately the average of all the daily maximum values reported in the DMR. This is also the previous permit limit.

Table 4. Effluent data (outfall 001) from Puyallup River TMDL study.

Date	Flow cfs	Temp. °C	pH	NH3 mg/L	TSS mg/L	TRCl mg/L	As µg/L	Cd µg/L	Cr µg/L	Hg µg/L	Zn µg/L	Cu µg/L	Ag µg/L	Pb µg/L
Sep-18-90	0.86	21.6	8.27	6.3	4	1.7	<1	0.1	<5	0.2	5.2	<2	<.05	0.99
Sep-19-90	0.88	21.1	8.7	7.55	1	5	1.2	<0.1	10	0.14	3.4	2.6	<.05	0.81
Oct-2 90	0.9	19.5	8.58	6.07	4	3.5								
Oct-3-90	0.88	19.9	8.41	7.76	9	5.8	1.6	0.23	<5	.044	7.1	<2	<0.5	3.98

PROPOSED PERMIT LIMITATIONS AND CONDITIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Water Quality Standards (Chapter 173-201A WAC). The more stringent of these two limits must be chosen for each of the parameters of concern. In addition, any waste load allocations (WLA) must comply with any pre-determined total maximum daily load for the receiving waterbody. Each of these types of limits as applicable to the various outfalls is described in more detail below.

Technology-based Effluent Limitations

The Revised Code of Washington (RCW) 90.48.010, 90.52.040, and 90.54.020 requires the use of all known, available and reasonable methods of prevention, control and treatment (AKART) before any wastes and other materials and substances enter state waters.

For outfall 001, technology based limits are derived from the following EPA effluent limitations: Best Available Technology Economically Achievable (BAT), 40 CFR 469.15, New Source Performance Standards (NSPS), 40 CFR 469.17, and Best Conventional Pollution Control Technology (BCT), 40 CFR 469.19. For this industry, BAT=NSPS. Relevant effluent limits are shown in Table 5.

Table 5. Technology based effluent limits

Parameter	Monthly Average	Daily Maximum
Fluoride (Total)	17.4 mg/L	32.0 mg/L
pH	Within the range of 6-9 standard units	
Total Toxic Organics (TTO)	N/A	1.37 mg/L

Forty (40) CFR 469.18 contains pretreatment standard for outfall 002 as 1.37 mg/L of TTOs.

TTO is defined for this industry (40 CFR 469.12) as the sum of the concentrations for each of the following toxic organic compounds which is found in the discharge at a concentration greater than ten (10) micrograms per liter:

1,2,4 Trichlorobenzene;	chloroform;	1,2 Dichloroethane
1,2 Dichlorobenzene;	ethylbenzene;	1,1,2 Trichloroethane
1,3 Dichlorobenzene;	carbon tetrachloride;	2 Chlorophenol
1,4, Dichlorobenzene;	dichlorobromomethane;	2,4 Dichlorophenol
1,1 Dichloroethylene;	2,4,6 Trichlorophenol;	4 Nitrophenol
pentachlorophenol;	di-n-butyl phthalate	anthracene
1,2 Diphenylhydrazine;	isophorone;	butylbenzyl phthalate
1,1,1 Trichloroethane;	methylene chloride;	naphthalene
2 Nitrophenol;	phenol;	bis (2-ethylhexyl) phthalate
tetrachloroethylene;	toluene;	trichloroethylene

In lieu of monitoring for TTOs, federal regulations (40 CFR Part 469.13) allows industries to submit a "solvent management plan". Upon approval of the plan, the Permittee may include the following certification as a comment on the monthly discharge monitoring report in lieu of monitoring for TTO: "Based on my inquiry of the person or persons directly responsible for managing compliance with the permit limitation for total toxic organics (TTO), I certify that, to the best of my knowledge and belief, no dumping of concentrated toxic organics into the wastewaters has occurred since filing the last discharge monitoring report. I further certify that this facility is implementing the solvent management plan submitted to and approved by Ecology."

Matsushita Semiconductor submitted a "solvent management plan" in September, 1991. This was revised as per Ecology's comments and resubmitted in June, 1992. The plan was accepted by Ecology and as of August 1992, monitoring for TTOs for both outfalls 001 and 002 was terminated in lieu of certification discussed above.

Performance Based Effluent Limits

Performance based effluent limits were derived based on application of statistical methods contained in Appendix E of: Technical Support Document for Water Quality-Based Toxics Control, U.S. EPA 505/2-90-001, 1991. The monthly average and daily maximum effluent limits were calculated using the current effluent data from January, 1992 through September, 1993. A summary of the data, log transformation, associated statistical parameters, and calculated permit limits for outfall 001 are contained in the appendix.

Permit limits for outfall 001 were calculated by transforming the effluent data to the natural logarithm, calculating log-space statistics (which better represent a normal distribution), and transforming the results back from log-space. Performance based daily maximum values for phosphorus and TSS are close to the daily maximum limits contained in the previous permit, which will be retained in the reissued permit.

Acetone and Isopropyl alcohol (IPA) in outfall 002

Data on acetone and IPA submitted with the permit application is reproduced in Table 6 below.

Table 6. Acetone and IPA concentration in outfall 002 discharge

Date	Acetone (mg/L)	IPA (mg/L)	Date	Acetone (mg/L)	IPA (mg/L)
2/21/91	6.0	110	5/23/91	0.13	1.2
8/13/91	1.0	7.9	9/25/91	3.3	23.0
10/23/91	12.0	16.0	11/20/91	5.3	2.5 U
12/4/91	14.0	5.0 U	1/1/92	8.1	1.9
2/7/92	14.0	5.3	3/4/92	15.0	19.0
4/1/92	25.0	5.0 U	5/6/92	3.5	5.0 U
6/3/92	20.0	51.0	7/1/92	7.2	33.0
8/6/92	0.15		0.061		

U = detection limit for specific sample and analyses event

Spray (1993) reviewed the existing literature to determine the environmental effects of acetone and concluded that there were no reported inhibition criteria for acetone for wastewater treatment plants. 40 CFR Part 503 does not contain any sludge re-use criteria for acetone. Activated sludge processes can remove 97 percent of incoming acetone. Surface water quality does not contain any criteria for acute or chronic toxicity to aquatic organisms. However, National Institute for Occupational Safety and Health (NIOSH) (1990) lists the concentration of acetone in air that may be "immediately dangerous to life or health" (IDLH) as 20,000 ppm. OSHA's permissible exposure limit (PEL) for acetone is 750 ppm and that of NIOSH is 250 ppm (590 mg/m^3). The lowest explosive limit (LEL) at room temperature is 2.5 percent by volume. Based on method for development and implementation of local discharge limitations (EPA 1987), the concentration of acetone in the effluent must be less than 60380 mg/L based on an LEL of 2.5 percent and less than 820 mg/L based on PEL of 590 mg/m^3 (see Appendix C). The concentration in Matsushita's outfall 002 (Table 6) is much lower than these values. Consequently, threats of explosive atmospheres as well as fume toxicity does not exist in sanitary sewers adjacent to outfall 002, nor at the Puyallup wastewater treatment plant (the concentration of acetone would be further diluted before reaching the treatment plant, unless other sources exist). 40 CFR Part 403.5 (b)(1) prohibits the discharge of waste streams to POTW with a Flash point of less than 140°F. Acetone has a flash point of 0°F. However, the flash point of the wastestream is not known. The flash point of waste stream at outfall 002 would be required to be measured on a monthly basis for a period of one year to determine if it meets the criteria. Method for flash point determination is contained in 40 CFR 261.21.

Forty (40) CFR Part 503 does not contain any sludge re-use criteria for IPA. Activated sludge process inhibitory concentration for IPA could not be found in available references. Surface water quality does not contain any criteria for acute or chronic toxicity to aquatic organisms from IPA. NIOSH lists IDLH concentration of IPA in air as 12,000 ppm. NIOSH and OSHA's permissible exposure limit (PEL) for IPA is 400 ppm (980 mg/m^3). The lowest explosive limit (LEL) at room temperature is 2.0 percent by volume. Based on method for development and implementation of local discharge limitations (EPA 1987), the concentration of IAP in the effluent must be less than 8000 mg/L based on an LEL of 2

percent and less than 160 mg/L based on PEL of 980 mg/m^3 (see Appendix C). The concentration in Matsushita's outfall 002 (Table 6) is much lower than these values. Consequently, threats of explosive atmospheres as well as fume toxicity does not exist in sanitary sewers adjacent to outfall 002, nor at the Puyallup wastewater treatment plant (the concentration of IAP would be further diluted before reaching the treatment plant, unless other sources exist). 40 CFR Part 403.5 (b)(1) prohibits the discharge of waste streams to POTW with a Flash point of less than 140°F. IPA has a flash point of 53°F. However, the flash point of the wastestream is not known. The flash point of waste stream at outfall 002 would be required to be measured on a monthly basis for a period of one year to determine if it meets the criteria. Method for flash point determination is contained in 40 CFR 261.21.

The solvent management plan submitted by Matsushita addressed acetone and IPA in addition to TTOs. However, the permit will specifically require Matsushita to evaluate the use and management of acetone and IPA in their process and to determine means to reduce their discharge to outfall 002.

Water Quality-Based Effluent Limitations

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Water Quality Standards. The Washington State Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the waters of the state. Several major elements of the State's Water Quality Standards are discussed in Figure 1. The parameters of interest with respect to water quality are BOD, ammonia, pH, fluoride, phosphorus, total residual chlorine, and metals.

Numerical Criteria: "Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards (Chapter 173-201A WAC), which specify the allowable levels of pollutants in a receiving water. Numerical criteria for dissolved oxygen and turbidity are among the criteria contained in WAC 173-201A-030. Numerical criteria are also listed for many toxic substances including chlorine and ammonia (WAC 173-201A-040). Numeric criteria set forth in the Water Quality Standards are used to derive the effluent limits in a discharge permit. When water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Narrative Criteria: In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) are used to limit acute and chronic toxicity, radioactivity, and other deleterious materials, and prohibit the impairment of the aesthetic value of the waters of the state. Narrative criteria describe the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

Antidegradation Policy: The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

Mixing Zones: The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment at the point of discharge. The concentration of pollutants at the edge of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention and control (AKART).

Figure 1. Major elements of the State of Washington Water Quality Standards

BOD, ammonia, total residual chlorine, and phosphorus have been addressed during a total maximum daily load (TMDL) analysis of Puyallup River (Pelletier, 1993). Phosphorus is not a limiting nutrient in the Puyallup River and as such permit limit for phosphorus will be technology based. The TMDL document reports the maximum loadings (known as waste load allocations, WLA) for BOD, ammonia, and total residual chlorine in Matsushita's discharge to Puyallup River. These maximum loadings were determined to protect aquatic life from depressed oxygen levels and toxicity effects.

The far-field effect of BOD and ammonia is a dissolved oxygen depression in the river. Ammonia and chlorine are also toxic to aquatic life. The WLAs for ammonia and chlorine were based on protection from aquatic toxicity. However, the WLA for ammonia is also protective of the far-field effects on dissolved oxygen in conjunction with the WLA for BOD.

Mixing Zone

Because of the reasonable potential for pollutants in the proposed discharge to exceed water quality criteria, a mixing zone has been authorized in this permit in accordance with Chapter 173-201A WAC. The mixing zone must meet the most stringent combination of the following:

a) For chronic mixing zone

   i) Maximum allowable length downstream of port = 300 feet plus depth of water over discharge port.
   ii) Maximum allowable length upstream of port = 100 feet.
   iii) Not occupy greater than 25 percent of the width of water body.
   iv) Not utilize greater than 25 percent of the critical receiving water flow.

b) For acute mixing zone

   i) Not extend beyond 10 percent of the distance towards the upstream and downstream boundaries of an authorized mixing zone from discharge port.
   ii) Not utilize greater than 2.5 percent of the critical receiving water flow.
   iii) Not occupy greater than 25 percent of the width of the water body.

Effluent flow used in determining dilution factors was a combination of Puyallup POTW and Matsushita flow. A flow of 0.7 mgd was used for Matsushita, this being the daily maximum flow. This flow does not include discharge resulting from periodic flushing of the tight-line. Whenever the pH difference between the upper (at Matsushita) and lower (at Puyallup POTW) end of the tightline is 1.5 to 2 units, pH-sanitization of the tightline is carried out. The pH of the discharge is increased to 11 for 4 to 6 hours. The high pH water is diverted to a tank at the POTW (via a pH-excursion-triggered mechanism) before being discharged to headworks of the POTW. The line is then flushed with 280,000 gallons of fire hydrant water. Part of this water also goes to the headworks depending on pH of the flush water. The frequency of such sanitization/flushing is approximately once every 5 weeks. During flushing (approximately 8 hours) the discharge rate will be 0.98 mgd under current production levels.

For the Puyallup POTW, a flow of 5.85 mgd (daily maximum) was used to calculate dilution factors at edge of acute zone, while 4.8 mgd (maximum monthly average) was used for the chronic zone. For near field effects of ammonia and chlorine, the actual 7Q10 flow (757 cfs) in Puyallup River is used. Notice that this value is slightly lower than the original 7Q10 flow (778 cfs) in the TMDL report. The new value is based on additional flow data available since the report was written (Pelletier, 1994). For near field effects, seasonal 7Q20 flows (Pelletier, 1994) will also be considered to determine if dilution factors are less limiting which would warrant use of seasonal limits. The 7Q20 flows considered are for May-Oct (755 cfs) and Nov-April (757 cfs). Another set of 7Q20 flows considered is May-Nov (681 cfs) and Dec-April (911 cfs). For calculating wet weather dilution factors, the Puyallup POTW's wet weather design maximum (19 mgd) and design average (10.7 mgd) flows were used in conjunction with Matsushita's flow. 90th percentile of effluent and river temperatures were used for both annual and seasonal evaluation. Conductivity measurements of both effluent and receiving water conducted during the Puyallup River TMDL were used to determine salinity (according to procedures of Standard methods, 18th edition).

The dilution at the end of the boundaries of the allowable mixing zone was modelled using CORMIX 2, RIVPLUME, and UM. Models are believed to be unreliable for the discharge conditions due to shallow receiving water, multiport diffuser, and plugged outfall ports. All cases modelled determined less stringent dilution factors than those calculated based on utilization of maximum river flow allowed (25 percent for chronic, and 2.5 percent for acute). Essentially, the dilution factors were not effected by the additional flow created by the tightline flush (see Appendix C). The dilution factors based on annual 7Q10 were higher than those using seasonal 7Q20 flows (see Appendix C). The seasonal dilution factors based on May-Oct/Nov-April 7Q20 were higher compared to those based on May-Nov/Dec-April 7Q20.

In a letter to Ecology (dated April 15, 1994), Ed Barker (of Matsushita) indicated that Matsushita is seriously considering a separate single port diffuser for the discharge of its effluent to Puyallup river. This would potentially increase the dilution at the edge of acute and chronic zones for the proposed new outfall. However, such a proposal was not submitted with the application and cannot be addressed at this time. When plans for the individual diffuser are finalized and submitted to Ecology, the permit may be revised to incorporate any increased dilution resulting from the individual diffuser.

Ammonia Limit

The acute and chronic total ammonia criterion for the segment of Puyallup River near Matsushita/Puyallup POTW outfall for both annual and seasonal flows are as follows (Pelletier 1993, and Pelletier 1994):

Annual basis:		Acute = 6.8 mg/L;	Chronic = 1.3 mg/L
Seasonal:	May-Oct:	Acute = 6.8 mg/L;	Chronic = 1.3 mg/L
	Nov-April:	Acute = 11.2 mg/L;	Chronic = 1.9 mg/L
	May-Nov:	Acute = 6.8 mg/L;	Chronic = 1.3 mg/L
	Dec-April:	Acute = 11.3 mg/L;	Chronic = 1.9 mg/L

In determining the reasonable potential for violation of water quality criteria for ammonia, the maximum effluent concentrations in both Matsushita (25 mg/L) and Puyallup POTW (33 mg/L) discharge were used in conjunction with the respective flows (0.7 mgd or 1.6 mgd for Matsushita depending upon production, and 5.85 mgd for Puyallup POTW). The maximum possible combined ammonia concentration is therefore 32 mg/L (for current production of 10,000 wafer-outs per month) or 31.3 mg/L (for future production of 40,000 wafer-outs per month.

The "coefficient of variation" for both Matsushita and Puyallup ammonia data was calculated to be approximately 0.4.

Based on the maximum ammonia concentration in the combined flow, there is a reasonable potential to violate water quality standards (based on procedure as per EPA, 1991, see Appendix C). Water quality based effluent limits are thus required to be included in the permit.

Based on ammonia criteria, ambient NH_3-N concentration (0.07 mg/L for annual and May-Oct., and 0.1 mg/L for Nov-April) (see Pelletier, 1994), and dilution factors at the edge of acute and chronic zones (discussed above), both annual and seasonal effluent limits were calculated for current production levels (10,000 wafer outs per month) at Matsushita (see Appendix C). The annual effluent limits were higher than the seasonal limits. In all cases (annual or seasonal), the acute criteria was limiting.

For evaluation of the effects of increased production on effluent limits, only the dilution factors based on annual 7Q10 critical river flows will be considered. Following the same procedure as above, it was determined that acute ammonia waste load allocation was also limiting at increased production levels. Table 7 shows the effect of increased production on ammonia effluent limits.

Table 7. Effluent limits for ammonia as a function of production

Wafer Outs per month	Acute dilution factor	Ambient conc. mg/L	Water quality standard (acute) mg/L	Average monthly limit (AML) mg/L	Maximum daily limit (MDL) mg/L
10K	2.9	0.07	6.8	12	20
15K	2.8	0.07	6.8	11	19
20K	2.8	0.07	6.8	11	19
30K	2.7	0.07	6.8	11	18
40K	2.6	0.07	6.8	11	18

Thus, the final effluent limits for ammonia will be 18 mg/L daily maximum and 11 mg/L monthly average. These limits cannot be currently met with existing technology in place. A three year compliance schedule will thus be allowed. Ecology's "Water quality technical guidance manual" indicates that three years is adequate for design and construction of any needed treatment units. It may be noted that a maximum production of 40,000 wafer-outs per month will also be reached by approximately the third year of permit issuance.

In the interim, the previous permit limits of 32 mg/L daily maximum and 20 mg/L monthly average will be used as effluent limits. The interim mass based limits will be a function of the flow at a given production level. Table 8 shows the final and interim limits that will be imposed for outfall 001.

Table 8. Effluent limits for ammonia for outfall 001.

Production	Flow	Daily maximum		Monthly average	
wafer-outs/month	mgd	mg/L	lbs/d	mg/L	lbs/d
Interim effluent limits during three years of compliance schedule					
10,000	0.7	32	187	20	117
15,000	0.85 32	227	20	142	
20,000	1.00 32	267	20	167	
30,000	1.30 32	347	20	217	
Final effluent limits after three years of compliance schedule					
40,000	1.60 18	240	11	147	

These limits (Table 8) may change if and when Puyallup POTW expands the treatment facility. This expansion would result in an increase in the flow and subsequent decrease in the dilution factors and ammonia limits. A schedule of the planned expansion is not available at this time. The permit may be modified when relevant information on the expansion becomes available.

Chlorine limits

Effluent data for chlorine is obtained from the "Puyallup River TMDL" report as well as chlorine analysis conducted during whole effluent toxicity tests. Data for outfall 001 is presented in Table 9.

Table 9. Effluent chlorine concentration in outfall 001

Source	Date	Concentration, mg/L
TMDL study	September 18, 1990	1.7
	September 19, 1990	5.0
	October 2, 1990	3.5
	October 3, 1990	5.8
Toxicity tests	1st Qtr, 1992 (acute test)	0.2
	3rd Qtr, 1992 (acute test)	0.5-0.7
	4th Qtr, 1992 (chronic test)	<0.1
	1st Qtr, 1993 (chronic test)	0.3-0.7

The TMDL reports a higher concentration of chlorine than those obtained during the toxicity tests. The TMDL data, either does not represent the current conditions or the chlorine measurements during toxicity tests are not reflective of in line concentrations. The second possibility is more likely. For example, the first quarter, 1993 sample dates were March 8th, 10th, and 12th, whereas the toxicity test commenced on March 31, 1993. The lag period may be responsible for decreased chlorine concentration through volatilization. A performance based limit can not be evaluated with the limited available data.

The acute and chronic total residual chlorine (TRCl) criterion for fresh water aquatic toxicity are 0.019 mg/L and 0.011 mg/L, respectively.

Based on data presented in Table 9, these criteria cannot be currently met at the end of the pipe. Thus dilution zones are allowed.

In determining the reasonable potential for violation of water quality criteria for TRCl, the maximum effluent concentrations in both Matsushita (5.8 mg/L) and Puyallup POTW (0.3 mg/L) discharge were used in conjunction with the respective flows (0.7 mgd or 1.6 mgd for Matsushita depending upon production, and 5.85 mgd for Puyallup POTW). The maximum possible combined TRCl concentration is therefore 0.885 mg/L (for current production of 10,000 wafer-outs per month) or 0.89 mg/L (for future production of 40,000 wafer-outs per month.

Based on the maximum TRCl concentration in the combined flow, there is a reasonable potential to violate water quality standards (based on procedure as per EPA, 1991, see Appendix C). Effluent limits are thus required to be included in the permit.

Based on TRCl criteria, ambient TRCl concentration (assumed 0.0 mg/L), and dilution factors at the edge of acute and chronic zones (discussed above), both annual and seasonal effluent limits were calculated for current production levels (10,000 wafer outs per month) at Matsushita (see Appendix C). The annual effluent limits were higher than the seasonal limits. In all cases (annual or seasonal), the acute criteria was limiting.

For evaluation of the effects of increased production on effluent limits, only the dilution factors based on annual 7Q10 critical river flows will be considered. Following the same procedure as above, it was determined that acute chlorine waste load allocation was also limiting at increased production levels. Table 10 shows the effect of increased production on chlorine effluent limits.

Table 10. Effluent limits for TRCl as a function of production

Wafer-outs per month	Acute dilution factor	Ambient conc. mg/L	Water Quality standard mg/L	Average monthly limit mg/L	Maximum daily limit mg/L
10000	2.9	0	0.019	0.03	0.06
15000	2.8	0	0.019	0.03	0.05
20000	2.8	0	0.019	0.03	0.05
30000	2.7	0	0.019	0.03	0.05
40000	0	0	0.019	0.02	0.05

Thus, the final effluent limits for TRCl will be 0.05 mg/L (50 μg/L) daily maximum and 0.02 mg/L (20 μg/L) monthly average. However, these limits cannot be currently met. A three year compliance schedule will thus be allowed.This period should provide sufficient time for implementation of any "best management practices" and necessary treatment systems. It may be noted that a maximum production of 40,000 wafer-outs per month will also be reached by approximately the third year of permit issuance.

These limits may change if and when Puyallup POTW expands the treatment facility. This expansion would result in an increase in the flow and subsequent decrease in the dilution factors and TRCl limits. A schedule of the planned expansion is not available at this time. The permit may be modified when relevant information on the expansion becomes available.

Fluoride Limits

EPA and State regulations do not contain any surface water quality criteria for fluoride. However, concentrations of fluoride that do not interfere with the specified beneficial uses have been documented (Water Quality Criteria, 3-A, California SWRCB) as follows:

Domestic water supply	0.7-1.2 mg/L
Industrial water supply	1.0 mg/L
Irrigation water	10.0 mg/L
Stock watering	1.0 mg/L
Aquatic life (fish) reproduction	1.5 mg/L

EPA's Aquatic toxicity information retrieval system (AQUIRE) was used to review data on aquatic toxicity of fluoride. It appears that the toxicity of fluoride is dependent on the form of fluoride present in the water. A relatively large data base is available on toxicity of sodium fluoride to aquatic organisms. The data is highly variable. For example, mortality effects were observed in *Daphnia magna* (water flea) when exposed for 7 days to a wide range of sodium fluoride concentrations (0.45 μg/L to 118589 μg/L) (G. Dave, 1984). LC_{50} (concentration that kills 50 percent of test population) for trout has been determined to be 2.3 to 7.5 mg/L of sodium fluoride (Neuhold and Sigler, 1960). Most common form of fluoride in Matsushita's discharge is either calcium fluoride or fluoride ion (Ed Barker, Matsushita Semiconductor, December 20, 1993, personal communications). AQUIRE data base indicates that acute effects (mortality) are observed in a variety of organisms (Gobi, Red sea bearm, shrimp, red algae, little neck clam) at calcium fluoride concentrations of 232 mg/L when exposed for 4 days (Ishio and Nakagawa, 1971). Acute toxicity to fluoride ion was observed in brown trout at concentrations of 125 mg/L (Woodiwiss and Fretwell, 1974). Chronic toxicity, as noted above, is generally more limiting then acute toxicity effects. Fish migration has been shown to be impaired at fluoride concentrations of 0.5 mg/L with 0.2 mg/L being the apparent threshold (Damkaer and Dey, 1989).

The City of Puyallup does not add fluoride to its water. The water supply is from natural springs which contain 0.2 mg/L of fluoride. Assuming that this concentration is present in City of Puyallup POTW discharge, the fluoride concentration at the edge of mixing zone would be a result of dilution factor at the edge of the mixing zone, dilution provided by POTW discharge, and fluoride concentration in Matsushita effluent. Critical conditions would be during summer/dry weather period when river flows are low and POTW discharge is also low. The maximum dry weather flow from POTW is 5.85 MGD and maximum monthly average is 4.8 MGD. Using a daily maximum flow of 0.7 MGD for Matsushita (at 10,000 wafer-outs per month), and a technology based daily maximum limit of 26 mg/L (the previous permit limit), the end of the pipe concentration (for mixed flow of Matsushita and POTW, and an instream dilution factor of 23 at edge of chronic zone), will be 0.15 mg/L. For acute conditions (dilution factor of 2.9), the concentration would be 1 mg/L. At maximum capacity (40,000 wafer-outs per month, with a flow of 1.6 MGD), the respective concentrations at edge of acute (dilution factor of 2.6) and chronic (dilution factor of 20) zone are 2.2 mg/L and 0.33 mg/L.

Thus, at the edge of chronic zone the concentration is below that which effects fish reproduction (1.5 mg/L) and that hinders fish passage (0.5 mg/L). It may be noted however, that actual effluent fluoride (performance based) concentration is a daily max of 17 mg/L (Appendix C). This would result in a concentration of 0.1 mg/L at the edge of chronic zone and 0.67 mg/L at the edge of acute zone for current production level of 10,000 Wafer-outs per month. At 40,000 wafer-outs per month, the concentration at the edge of acute and chronic zone would be 1.46 mg/L and 0.22 mg/L, respectively. Thus, with either the previous permit limits or the performance based effluent concentrations, impacts on water quality are minimal. However, The fluoride waste stream was re-routed to fluoride/phosphate treatment system in December, 1991. The performance of the treatment system was thus evaluated with data from two years. Since, Matsushita is increasing production beginning October 1995 through October 1997, performance will be re-evaluated with permit renewal in 1999. Thus previous technology based permit limits will be retained (see Table 1).

BOD$_5$ Limit

Water quality based BOD$_5$ limits were based on the Puyallup River total maximum daily load (TMDL) determination conducted by Ecology (Pelletier, 1993). The BOD$_5$ allocated to Matsushita is 175 lbs/day based on far field effects on oxygen depression in Puyallup River. The daily maximum BOD$_5$ limit in the previous permit was also 175 lbs/d. The mass limit is based on a concentration based daily maximum limit of 30 mg/L. A monthly average limit of 15 mg/L was included in the previous permit and this was based on effluent design criteria present in November 1990 engineering report. Matsushita has committed to maintain the maximum mass loadings for BOD$_5$ even if production increases (as per NPDES permit application for renewal). Thus, there would be a decrease in the BOD$_5$ concentrations with increased production.

Metals Limit

The effluent concentrations of Arsenic (As), Cadmium (Cd), Chromium (Cr) Mercury (Hg), Zinc (Zn), and Copper (Cu) as measured during the Puyallup River TMDL have been shown earlier in Table 4. To determine a reasonable potential for violation of water quality criteria (WAC 173-201A) for these metals, a combined maximum concentration of these metals at the outfall (at Puyallup River) will be first calculated based on maximum metals concentration in both Matsushita and Puyallup POTW effluent and respective flows. Table 11 shows the maximum metal effluent concentration for combined Matsushita and Puyallup POTW flow.

Table 11. Maximum combined metal effluent concentrations

Maximum effluent concentrations in Matsushita and Puyallup combined flow						
Metal	Maximum effluent conc. (μg/L)		Maximum combined effluent concentration (μg/L)			
			10,000 wafer-outs per month		40,000 wafer-outs per month	
	Matsushit	Puyallup POT	5.85 MGD at POT	4.8 mgd at POT	5.85 MGD at POT	4.8 mgd at POTW
Arsenic	1.6	2.1	2.0	2.0	2.0	2.0
Cadmium	0.23	0.16	0.17	0.2	0.18	0.2
Copper	2.6	24.6	22.2	21.8	19.9	19.1
Chromiu	10	0	1.1	1.3	2.1	2.5
Lead	3.92	2.35	2.5	2.5	2.7	2.7
Mercury	0.2	0.16	0.16	0.2	0.17	0.2
Silver	0	2.08	1.86	1.8	1.63	1.6
Zinc	7.1	43.5	39.6	38.9	35.7	34.4

Water quality criteria in WAC 173-201A for Copper, Cadmium, Lead, Silver, and Zinc are based on dissolved fraction of these metals, but expressed as total recoverable. Knowing the dissolved to total recoverable fraction in the ambient receiving water, the criteria (WAC 173-201A) can be adjusted to reflect actual total recoverable metals. The Puyallup River TMDL study contains some data on total and dissolved metals concentration in Puyallup River. This data together with data collected at Ecology's Puyallup River monitoring station on Meridian Street was used to determine the dissolved to total recoverable fraction for copper, cadmium, lead, and zinc (see Appendix C). The 95th percentile of the fractions indicate that 100 percent of the metals are in a dissolved state. A ratio for silver could not be evaluated, since all data were below detection. A conservative ratio of 1 was used for silver. This means that when evaluating reasonable potential, the water quality criteria of WAC 173-201A will be used without any adjustments.

In evaluating the reasonable potential, the maximum concentration of metals in the combined effluent (Table 11) was used in conjunction with different production levels at Matsushita (see Appendix C). Maximum ambient concentrations obtained from either river mile 8.3 or 5.7 was used in evaluating reasonable potential (see Appendix C). Ambient hardness of 47 ppm (90th percentile of data) was determined using data from Meridian Street station and the TMDL study. The mean hardness in Matsushita's effluent was determined as 364 ppm and that in Puyallup POTW's effluent 81 ppm (using data present in Puyallup River TMDL study). The hardness in the combined flow was calculated as 111 mg/L (most stringent of hardness based upon maximum and average POTW flows and combination of production levels). Based on the dilution factors (for 40,000 wafer-outs per month) and ambient (47 mg/L) and effluent (111 mg/L) hardness concentrations, the resultant hardness at the edge of acute and chronic zone were calculated as 71.6 mg/L and 50 mg/L, respectively. These hardness concentrations were then used to determine the water quality acute and chronic criteria, respectively.

Evaluation of data indicates that for combined effluent, there is a reasonable potential to violate water quality criteria for copper, mercury, and silver (Appendix C). Effluent limits for these metals are therefore required to be included in the permit. Water quality based effluent limits were determined at a production level of 40,000 wafer-outs per month and previously determined dilution factors (see Appendix C). Silver is absent in Matsushita's effluent, therefore, no limits will be imposed on Matsushita's effluent. Maximum copper concentration in Matsushita's effluent is 2.6 μg/L. Using the reasonable potential multiplier (3.77), the resultant concentration (2.6 x 3.77= 9.8 μg/L) is lower than either the monthly average (20.0 μg/L) or daily maximum (29.2 μg/L) limit. Therefore, no limits on copper will be imposed on Matsushita's effluent. For mercury, the ambient receiving water concentration (0.08 μg/L) is higher than the criteria (0.012 μg/L). Thus, the ambient concentration is used as the criteria as per WAC 173-201A-070(2) and as a daily maximum effluent limit. The water quality based effluent limit for mercury is much lower than the current effluent concentrations. Thus a compliance schedule of 5 years will be allowed in the permit. Five years will provide adequate time for determination of the source of metals, implementation of any best management practices that would reduce effluent mercury concentration, and design and construction of any treatment system required. Interim effluent limits would be placed in the permit for the duration of the compliance schedule. Interim limits are calculated using maximum effluent concentration and a multiplier (3.77) used to evaluate reasonable potential. The interim limit for mercury is therefore 0.75 μg/L used as a daily maximum.

Whole Effluent Toxicity

The Water Quality Standards also require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Whole effluent toxicity testing measures both acute toxicity and chronic toxicity. Whole effluent toxicity testing requirement is authorized by RCW 90.48.520 and 40 CFR 122.44 and Chapter 173-205 WAC.

Acute Toxicity

Acute toxicity tests measure death as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment. Acute toxicity testing of effluent from outfall 001 was required in the previous permit on a quarterly basis for the first year and semi-annually thereafter. For the first year three organisms were required to be tested: 1) Rainbow trout, *Onchorhynchus mykiss*, 2)*Daphnia pulex*, and 3) Fathead minnow, *Pimephales promelas*. For subsequent years the most sensitive of these three species was required to be tested. Table 12 shows the results of these acute toxicity tests. Both the daphnia and fathead minnow were relatively more sensitive to Matsushita's effluent than the rainbow trout. Thus, only Daphnia and fathead minnow data is presented in Table 12. As per WAC 173-205-050(2)(a)(i) a discharge has a reasonable potential for whole effluent acute toxicity in receiving water if at the end of effluent characterization, the median survival in 100 percent effluent is less than 80%, or if any individual test result shows less than 65 percent survival in 100 percent effluent. If a reasonable potential exists, permit limits for whole effluent acute toxicity must be included in the permit.

Table 12. Percent surviving during whole effluent acute toxicity testing

Sample date	Species	% Effluent	% Survival	LC50,(% effluent)
1/9/92	*Daphnia pulex*	100	0	
	Fathead minnow	100	100	
1/16/92	*Daphnia pulex*	100	0	7.9
3/19/92	*Daphnia pulex*	100	27	
	Fathead minnow	100	97	
3/27/92	*Daphnia pulex*	100	50	100
6/19/92	*Daphnia pulex*	100	87	
	Fathead minnow	100	97	
9/23/92	*Daphnia pulex*	100	0	
	Fathead minnow	100	47	
10/7/92	*Daphnia pulex*	100	0	14.9
	Fathead minnow	100	100	>100
12/7/92	*Daphnia pulex*	100	100	
	Fathead minnow	100	100	
6/21/93	Fathead minnow	100	100	

Based on data in Table 12, the median survival in 100 percent effluent is 87 percent but there are several tests that indicate less than 65 percent survival in 100 percent effluent. Thus, whole effluent acute toxicity limit is included as an effluent limit in the permit. Using a dilution factor at the edge of acute zone of 2.6 (for 40,000 wafer-outs per month), a 38.5 percent effluent must be used for compliance monitoring. The limit is no statistical significant difference in response (during acute toxicity test) between control and acute effluent critical concentration (38.5 percent effluent). Compliance monitoring will be required on a quarterly basis using *Daphnia pulex* for the first three quarters and fathead minnow for the fourth quarter of each year of permit term.

Chronic Toxicity

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Chronic toxicity testing of effluent from outfall 001 was required in the previous permit on a quarterly basis in the second year of the permit issuance date. Three organisms were required to be tested:1) Fathead minnow, *Pimephales promelas*, 2) *Ceriodaphnia dubia*, and 3) *Selenastrum capricornutum*. Table 13 shows the results of these chronic toxicity tests. As per WAC 173-205-050(2)(a)(i) a discharge has a reasonable potential for whole effluent chronic toxicity in receiving water if at the end of effluent characterization, the no observed effects concentration (NOEC) is less than the acute critical effluent concentration (ACEC). If a reasonable potential exists, permit limits for whole effluent chronic toxicity must be included in the permit.

Table 13 indicates that NOEC for *Selenastrum capricornutum* is much higher than the ACEC of 38.5 percent effluent. There was at least one instance when NOEC for Fathead minnow was less than the ACEC. For *Ceriodaphnia dubia*, the NOEC was always less than the ACEC of 38.5%. Thus, whole effluent chronic toxicity limit is included as an effluent limit in the permit. Using a dilution factor at the edge of chronic zone of 20 (for 40,000 wafer-outs per month), a 5 percent effluent must be used for compliance testing. The limit is no statistical significant difference in response (during chronic toxicity test) between control and chronic critical effluent concentration (5 percent effluent). Compliance monitoring will be required on a quarterly basis using *Ceriodaphnia dubia* for the first three quarters and fathead minnow for the fourth quarter of each year of permit term.

Table 13. NOEC during whole effluent chronic toxicity testing.

Sample date	Species	% Effluent	Survival, %	NOEC, %
12/7-12/11/92	Fathead minnow	100	82	50
	Ceriodaphnia Dubia	100	0	25
	Selenastrum capricornutum	100		>100%
3/8-3/12/93	Fathead minnow	100	29	<6.25
	Ceriodaphnia Dubia	100	0	<6.25
	Selenastrum capricornutum	100		>100
6/21-6/25/93	Fathead minnow	100	37	50
	Ceriodaphnia Dubia	100	0	<6.25
	Selenastrum capricornutum	100		>100
9/20-9/24/93	Fathead minnow	100	0	50
	Ceriodaphnia Dubia	50	33	6.25
	Selenastrum capricornutum	100		>100

If the permittee makes process or material changes which in the Department's opinion results in an increased potential for effluent toxicity, then the Department may require additional effluent characterization in a regulatory order, by permit modification, or in the next permit renewal. The permittee may demonstrate to the Department that changes have not increased effluent toxicity by performing additional toxicity testing at the time the process or material changes are made. This demonstration may include the use of rapid screening tests if rapid screening tests were conducted as auxiliary tests during effluent characterization.

Ground Water Quality

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

The iron (0.407 mg/L) and manganese (0.09 mg/L) data for outfall 003 indicates that the Ground Water Quality Standards (0.3 mg/L for iron and 0.05 mg/L for manganese) may be exceeded. However, this is based on only one data point. Furthermore, Ground water standards are set in the ground water, as a compliance point. Ambient ground water pollutant concentrations upstream of influence and downstream are compared to the ground water standards to determine compliance. If the background concentrations are greater than the standards, the enforcement limits are equal to the background concentrations. However, if background concentrations are lower than the standards, the enforcement limit is background plus 10 percent of the difference between background and the standard. Thus, the existing upstream monitoring well and the effluent must be monitored for a year to evaluate the potential of ground water degradation. Depending upon the results of this monitoring, permit limits may be imposed through a permit modification.

Final Effluent Limits

The final effluent limits for outfalls 001, 002, and 003 are presented in Table 14 below.

Table 14. Effluent limits for outfall 001, 002, and 003.

Outfall	Parameter		Monthly Average	Daily Maximum
001	Flow,	MGD	0.7-1.6*	1-1.88*
	pH,	std. units	Between 6.0 and 9.0	
	BOD_5,	lbs/day	88	175
		mg/L	15-7*	30-13*
	TSS,	lbs/day	88-200*	175-400*
		mg/L	15	30
	Fluoride,	mg/L	16	26
	Phosphorus,	mg/L	3	5
	Ammonia,	lbs/day	64-147*	105-240*
		mg/L	11	18
	TRCl,	µg/L		50
	TTO		Narrative statement required/	
	Mercury	µg/L		0.08
	WET (acute)		No significant difference in response between control and 38.5 percent effluent	
	WET (chronic)		No significant difference in response between control and 5% effluent	
002	Flow	MGD	0.038-0.076	
	TTO		Narrative statement required/	
	pH		Within the range of 6-9 standard units	
003	Flow		N/A No pond overflow permitted	
	pH		Between 6.0 and 9.0 standard units	

* Depending upon production. The range varies from a production level of 10,000 wafer outs per month to 40,000 wafer-outs per month (see permit condition S1).

/ A narrative statement in lieu of monitoring for TTOs must be submitted with the discharge monitoring report.

Comparison of Effluent Limits with the Previous Permit

The effluent limits presented in Table 14 were based on new information presented in the permit application, the Puyallup River TMDL study, and effluent characterization data obtained during the previous permit cycle. The current permit limits also reflect the proposed expansion of the facility to increase production from 10,000 wafer-outs/month to 40,000 wafer-outs/month. Flow limits have been increased accordingly. BOD_5 mass limit for outfall 001 is based on the TMDL for Puyallup River and is not allowed to change with increasing production. The limits are the same as the previous permit. The concentration based BOD_5 limit decreases when increased production results in increased flows. Final ammonia limits (outfall 001) are lower than those in the previous permit. The ammonia limits were based on aquatic toxicity evaluation of the combined Matsushita and Puyallup POTW flows. TSS,

fluoride, and phosphorus concentration based limits (outfall 001) in the previous permit have been retained. The mass based limits increases with increasing production. The TTO limits for outfall 001 and 002 have been removed. However, a narrative statement is required with "discharge monitoring reports". A TTO analyses will be required to be submitted with permit application for renewal. Based on whole effluent toxicity data collected during the previous permit cycle, both acute and chronic toxicity limits have been included in the new permit. Limits on Mercury concentration has been imposed on outfall 001 based on a reasonable potential for violation of water quality criteria.

Human Health

The conditions in this permit seek to protect aquatic life from toxic effects. It is assumed that protecting aquatic life will also protect the health of humans. If Ecology finds that this permit does not protect human health, the permit will be modified to incorporate new conditions as needed.

Sediment Quality

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no potential for the discharge of substances that may cause a violation of the sediment management standards.

MONITORING AND REPORTING

Effluent monitoring, recording, and reporting are required (WAC 173-220-210) to verify if the treatment process is functioning correctly and the effluent limitations are being achieved. The monitoring and testing schedule is detailed in the permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

OTHER PERMIT CONDITIONS

Spill Plan

The Permittee has developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The permit requires the Permittee to update this plan as required and submit it to the Department.

Solid Waste Plan

This permit requires, under the authority of 90.48.080, that the Permittee update the solid waste plan designed to prevent solid waste from causing pollution of the waters of the state. The plan must be submitted to the local permitting agency for approval, if necessary, and to the Department.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual NPDES permits issued by the Department.

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1987. Guidance Manual on the Development and Implementation of Local Discharge Limitations under the Pretreatment Program. Office of Water Enforcement and Permits, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

Dave, G.1984. Effects of fluoride on growth, reproduction and survival in Daphnia Magna. Comp. Biochem. Physiol. 78C(2):425-431

Damkaer, D.M.and D. B. Dey. 1989. Evidence for fluoride on salmon passage at John Day Dam, Columbia River, 1982-1986. North American Journal of Fisheries Management 9:154-162

Ishio, S. and H. Nakagawa. 1988. *Alterations in the Acid and Alkaline Phosphatase Quantities in Fluoride-Exposed Estuarine Goby, Boleophthalmus dussumieri*. Fluoride 21(3): 131-136.

Neuhold, J.M. and W.F. Sigler. 1960. Effects of sodium fluoride on carp and rainbow trout. Transactions of the American Fisheries Society 89:358-370

Pelletier, G. J. 1993. Puyallup River total maximum daily load for biochemical oxygen demand, ammonia, and chlorine. Washington State Department of Ecology, Environmental Investigations and Laboratory Services Program, Olympia, Washington

Pelletier, G. J. 1994. Design conditions for seasonal permits for selected NPDES dischargers in the Puyallup River Basin. Memo from Environmental Investigations and Laboratory Services Program to Southwest Regional Office, Washington State Department of Ecology, Olympia, Washington

Spray, E. J. 1993. review of acetone and its environmental effects in Wastewater. A report submitted to Washington State Department of Ecology by the City of Vancouver.

Tsivoglou, E.C., and J.R. Wallace. 1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Woodiwiss, F. S. and G. Fretwell, 1974, *The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo trutta) in the Trent River Authority Area.* Water Pollut. Control, 13: 396-405 (Author Communication Used).

Wright, R.M., and A.J. McDonnell. 1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

REVIEW BY THE PERMITTEE

A proposed permit was reviewed by the Permittee for verification of facts. Only factual items were corrected in the draft permit.

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page one of this fact sheet. The permit contains conditions and effluent limitations which are described in the preceding pages of this fact sheet.

Public notice of application was published on October 23, 1993 in *The Morning News Tribune* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

Following entity review, the Department will publish a Public Notice of Draft (PNOD) in *The Morning News Tribune* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, Washington, 98504-7775

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing *if it determines there is a significant public interest in the draft permit* (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

The Department will consider all comments received within thirty (30) days from the date of public notice of draft permit, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (206) 407-6280, or by writing to the address listed above.

APPENDIX B--DEFINITIONS

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Class 1 Inspection--A walk-through inspection of a facility that includes a visual inspection and some examination of facility records. It may also include a review of the facility's record of environmental compliance.

Class 2 Inspection--A walk-through inspection of a facility that includes the elements of a Class 1 Inspection plus sampling and testing of wastewaters. It may also include a review of the facility's record of environmental compliance.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

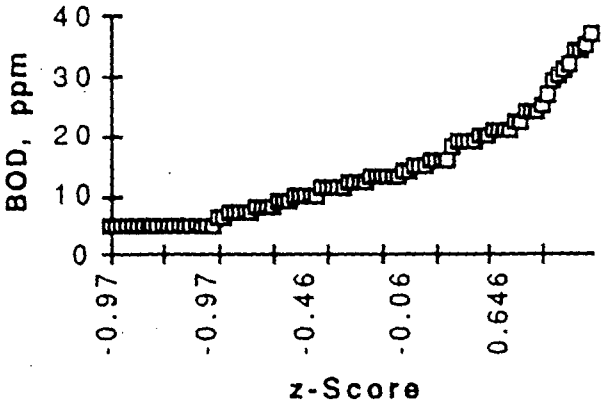
Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

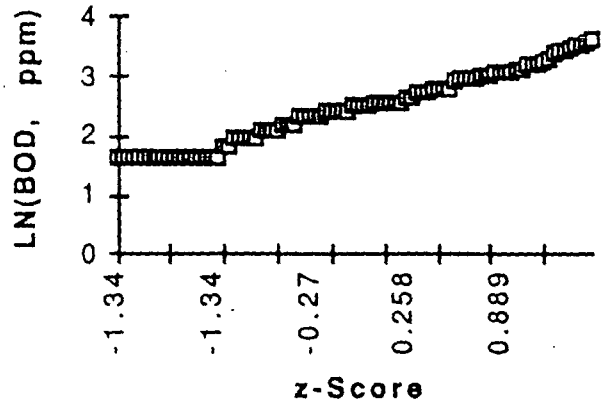
Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

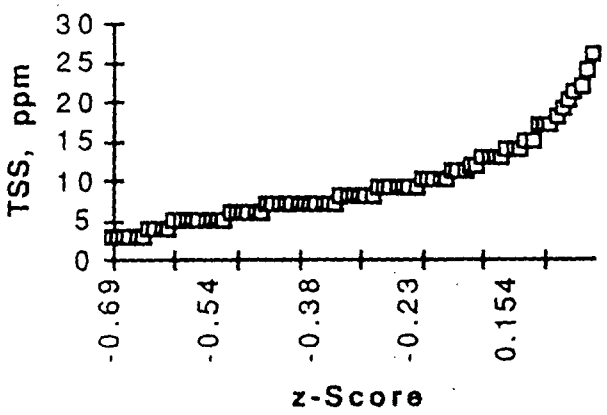
APPENDIX C--TECHNICAL CALCULATIONS

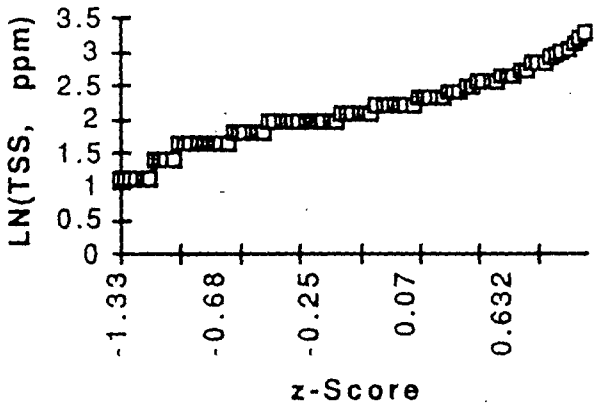
Calculation for Performance Based Effluent Limitation

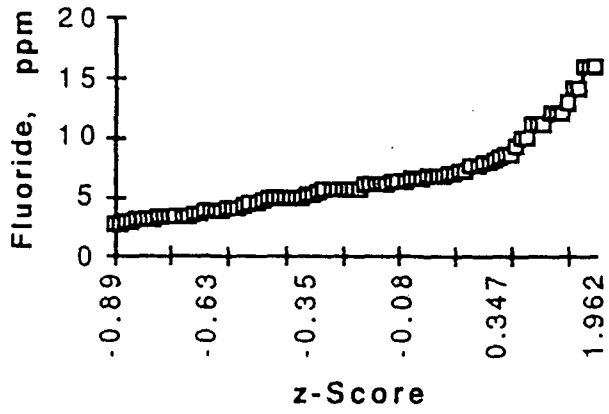
Log-normal distributions were assumed for all 1992-93 weekly data. Several outliers in the data were removed to preserve the validity of the distribution assumption. This is consistent with WAC 173-221-030(11). Figures below shows both the normal and log-normal distribution plots for various parameters during the period considered. These plots are exclusive of the outliers. The reduced data (exclusive of outliers) was used to determine performance based limits.







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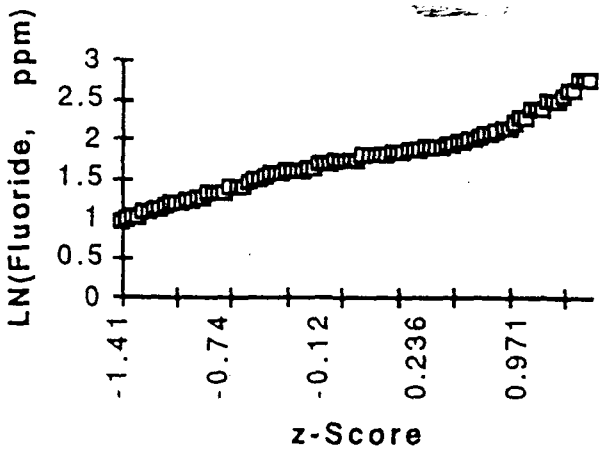
-0.08
0.347
1.962
z-Score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0
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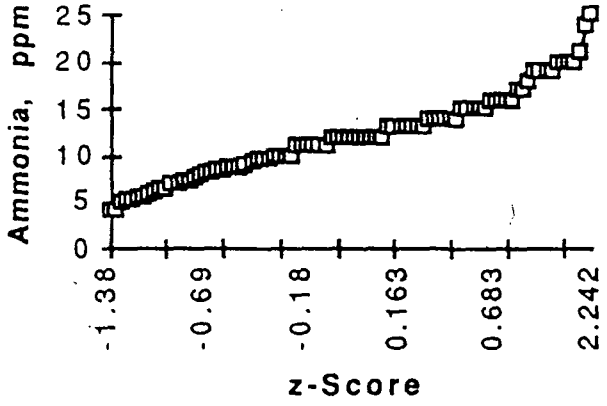
0.971
z-Score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20
15
10
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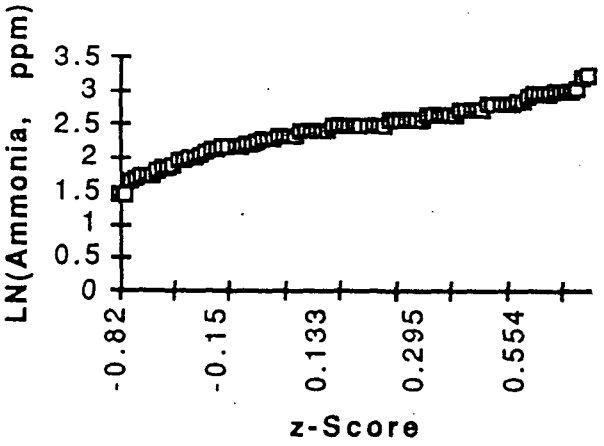
0.683
2.242
z-Score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1
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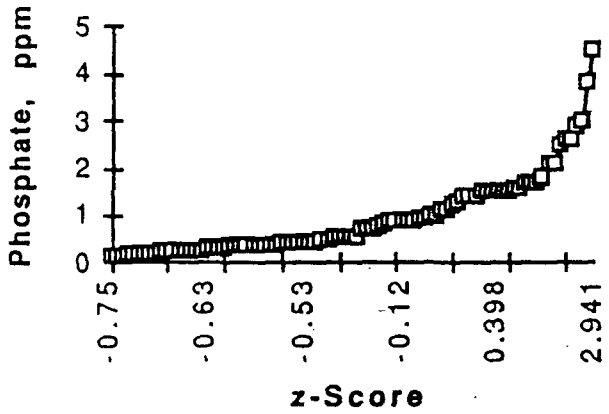
0.295
0.554
z-Score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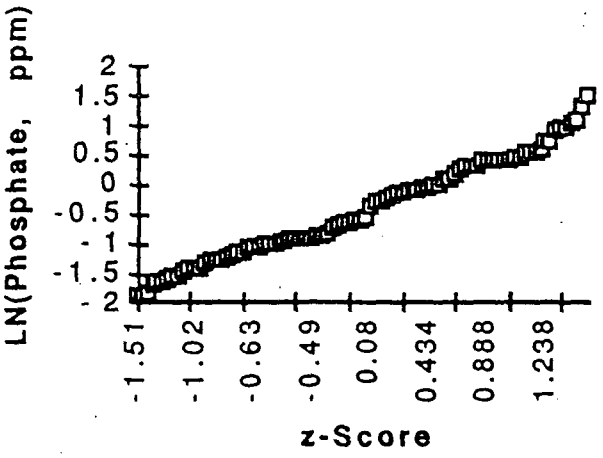
z-Score


LN(Phosphate, ppm)
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1.5
1
0.5
0
-0.5
-1
-1.5
-2
-1.51
-1.02
-0.63
-0.49
0.08
0.434
0.888
1.238
z-Score

Calculations for determination of performance based limits

BOD		TSS		Fluoride		Phosphate		NH3	
ppm	ln(ppm)	ppm	ln(ppm)	ppm	ln(ppm)	ppm	ln(ppm)	ppm	ln(ppm)
5	1.61	3	1.10	2.6	0.96	0.15	-1.90	4.1	1.41
5	1.61	3	1.10	2.7	0.99	0.15	-1.90	4.2	1.44
5	1.61	3	1.10	2.8	1.03	0.16	-1.83	5.1	1.63
5	1.61	3	1.10	2.8	1.03	0.18	-1.71	5.2	1.65
5	1.61	3	1.10	3	1.10	0.19	-1.66	5.4	1.69
5	1.61	3	1.10	3	1.10	0.19	-1.66	5.6	1.72
5	1.61	4	1.39	3.1	1.13	0.2	-1.61	5.6	1.72
5	1.61	4	1.39	3.1	1.13	0.21	-1.56	5.9	1.77
5	1.61	4	1.39	3.2	1.16	0.21	-1.56	6.1	1.81
5	1.61	4	1.39	3.3	1.19	0.23	-1.47	6.3	1.84
5	1.61	5	1.61	3.3	1.19	0.24	-1.43	6.5	1.87
5	1.61	5	1.61	3.3	1.19	0.24	-1.43	7	1.95
5	1.61	5	1.61	3.4	1.22	0.24	-1.43	7	1.95
5	1.61	5	1.61	3.4	1.22	0.26	-1.35	7.3	1.99
5	1.61	5	1.61	3.5	1.25	0.27	-1.31	7.4	2.00
5	1.61	5	1.61	3.5	1.25	0.27	-1.31	7.7	2.04
5	1.61	5	1.61	3.7	1.31	0.28	-1.27	8	2.08
5	1.61	5	1.61	3.8	1.34	0.29	-1.24	8.1	2.09
5	1.61	5	1.61	3.8	1.34	0.3	-1.20	8.2	2.10
5	1.61	6	1.79	3.8	1.34	0.31	-1.17	8.5	2.14
6	1.79	6	1.79	4	1.39	0.32	-1.14	8.5	2.14
6	1.79	6	1.79	4	1.39	0.35	-1.05	8.6	2.15
7	1.95	6	1.79	4	1.39	0.35	-1.05	8.7	2.16
7	1.95	6	1.79	4.3	1.46	0.35	-1.05	8.8	2.17
7	1.95	6	1.79	4.4	1.48	0.36	-1.02	8.9	2.19
7	1.95	7	1.95	4.4	1.48	0.36	-1.02	9.4	2.24
7	1.95	7	1.95	4.6	1.53	0.36	-1.02	9.5	2.25
8	2.08	7	1.95	4.8	1.57	0.37	-0.99	9.6	2.26
8	2.08	7	1.95	4.8	1.57	0.38	-0.97	9.6	2.26
8	2.08	7	1.95	4.8	1.57	0.39	-0.94	9.9	2.29
8	2.08	7	1.95	4.9	1.59	0.4	-0.92	10	2.30
9	2.20	7	1.95	4.9	1.59	0.4	-0.92	10	2.30
9	2.20	7	1.95	5	1.61	0.4	-0.92	10	2.30
9	2.20	7	1.95	5	1.61	0.4	-0.92	11	2.40
10	2.30	7	1.95	5.1	1.63	0.41	-0.89	11	2.40
10	2.30	7	1.95	5.2	1.65	0.42	-0.87	11	2.40
10	2.30	7	1.95	5.4	1.69	0.43	-0.84	11	2.40
10	2.30	8	2.08	5.5	1.70	0.48	-0.73	11	2.40
10	2.30	8	2.08	5.5	1.70	0.5	-0.69	11	2.40
11	2.40	8	2.08	5.6	1.72	0.52	-0.65	12	2.48
11	2.40	8	2.08	5.6	1.72	0.53	-0.63	12	2.48
11	2.40	8	2.08	5.6	1.72	0.54	-0.62	12	2.48
11	2.40	8	2.08	5.6	1.72	0.55	-0.60	12	2.48
11	2.40	9	2.20	5.6	1.72	0.56	-0.58	12	2.48
12	2.48	9	2.20	6	1.79	0.69	-0.37	12	2.48
12	2.48	9	2.20	6	1.79	0.74	-0.30	12	2.48
12	2.48	9	2.20	6	1.79	0.74	-0.30	12	2.48
12	2.48	9	2.20	6	1.79	0.79	-0.24	12	2.48
13	2.56	9	2.20	6.1	1.81	0.82	-0.20	12	2.48
13	2.56	9	2.20	6.3	1.84	0.86	-0.15	13	2.56
13	2.56	10	2.30	6.3	1.84	0.87	-0.14	13	2.56

Calculations for determination of performance based limits (continued)

BOD		TSS		Fluoride		Phosphate		NH3	
ppm	ln(ppm)	ppm	ln(ppm)	ppm	ln(ppm)	ppm	ln(ppm)	ppm	ln(ppm)
13	2.56	10	2.30	6.4	1.86	0.89	-0.12	13	2.56
13	2.56	10	2.30	6.5	1.87	0.9	-0.11	13	2.56
13	2.56	10	2.30	6.6	1.89	0.9	-0.11	13	2.56
14	2.64	10	2.30	6.6	1.89	0.96	-0.04	13	2.56
14	2.64	11	2.40	6.7	1.90	0.97	-0.03	13	2.56
15	2.71	11	2.40	6.7	1.90	0.98	-0.02	14	2.64
15	2.71	11	2.40	6.7	1.90	1	0.00	14	2.64
15	2.71	12	2.48	6.8	1.92	1.1	0.10	14	2.64
16	2.77	12	2.48	7	1.95	1.1	0.10	14	2.64
16	2.77	13	2.56	7	1.95	1.2	0.18	14	2.64
16	2.77	13	2.56	7.3	1.99	1.3	0.26	14	2.64
16	2.77	13	2.56	7.3	1.99	1.4	0.34	15	2.71
18	2.89	13	2.56	7.6	2.03	1.4	0.34	15	2.71
19	2.94	14	2.64	7.6	2.03	1.4	0.34	15	2.71
19	2.94	14	2.64	7.8	2.05	1.5	0.41	15	2.71
19	2.94	14	2.64	7.9	2.07	1.5	0.41	15	2.71
19	2.94	15	2.71	8.1	2.09	1.5	0.41	16	2.77
20	3.00	15	2.71	8.4	2.13	1.5	0.41	16	2.77
20	3.00	17	2.83	8.7	2.16	1.5	0.41	16	2.77
20	3.00	17	2.83	8.7	2.16	1.5	0.41	16	2.77
21	3.04	17	2.83	9.2	2.22	1.6	0.47	16	2.77
21	3.04	18	2.89	10	2.30	1.6	0.47	17	2.83
21	3.04	19	2.94	10	2.30	1.7	0.53	17	2.83
21	3.04	20	3.00	11	2.40	1.7	0.53	18	2.89
22	3.09	21	3.04	11	2.40	1.7	0.53	19	2.94
22	3.09	22	3.09	11	2.40	1.8	0.59	19	2.94
24	3.18	24	3.18	12	2.48	2.1	0.74	19	2.94
24	3.18	26	3.26	12	2.48	2.1	0.74	19	2.94
24	3.18			12	2.48	2.5	0.92	20	3.00
25	3.22			13	2.56	2.6	0.96	20	3.00
27	3.30			14	2.64	2.6	0.96	20	3.00
29	3.37			14	2.64	2.9	1.06	20	3.00
30	3.40			16	2.77	3	1.10	21	3.04
31	3.43			16	2.77	3.8	1.34	24	3.18
32	3.47			16	2.77	4.5	1.50	25	3.22
34	3.53								
34	3.53								
35	3.56								
37	3.61								
MAX	37	3.61	26	3.26	16	2.77	4.5	1.50	25	3.22
MIN	5	1.61	3	1.10	2.6	0.96	0.15	-1.90	4.1	1.41
AVG	15	2.56	9.39	2.10	6.51	1.76	0.94	-0.43	12.1	2.42
STDDEV	8.33	0.57	5.22	0.54	3.28	0.46	0.86	0.86	4.65	0.41
CV	0.55		0.56		0.5		0.91		0.38	
Daily max	48.2		28.4		17.1		4.85		29	
Monthly avg.	22.4		13.6		8.95		1.72		16.2	
No. of samples	4.5		4.5		4.5		4.5		4.5	

Calculation for Screening Levels of Acetone and Isopropyl Alcohol
(Based on procedures contained in EPA, 1987)

Acetone

molecular wt. (MW) = 58.09
henry's law constant (H_a) = 2.5 x 10^{-5} atm.m^3/mole
lowest explosive level (LEL) = 2.5% on volume basis
permissible exposure level (PEL) = 250 ppm, or 590 mg/m^3
total atmospheric pressure (P) = 1 atm.
Ideal gas constant (R) = 0.08206 atm.L/mole.°K
room temperature assumed (T) = 298.15 °K
temperature corresponding to vapor pressure
used to calculate Ha, (Tc) = 298.15 °K

Vapor phase concentration based on LEL, C_{vap} = LEL x (P/RT) x 10 mol/m^3
= 1.06269 mol/m^3

Henry's Law constant in units of (mol/m^3)/(mg/L), $H_m = H_a \times 10^3/(MW \times RT)$
= 1.76 x 10^{-5}
Henry's Law constant in units of (mg/m^3)/(mg/L), $H_c = H_a \times 10^6/(RT_c)$
= 0.71936

Screening level based on LEL, $C_l = C_{vap}/H_m$ = 60380 mg/L

Screening level based on PEL, C_p = PEL (mg/m^3)/H_c = 820 mg/L

Isopropyl alcohol

molecular wt. (MW) = 60
henry's law constant (H_a) = .00015 atm.m^3/mole
lowest explosive level (LEL) = 2% on volume basis
permissible exposure level (PEL) = 400 ppm, or 980 mg/m^3
total atmospheric pressure (P) = 1 atm.
Ideal gas constant (R) = 0.08206 atm.L/mole.°K
room temperature assumed (T) = 298.15 °K
temperature corresponding to vapor pressure
used to calculate Ha, (Tc) = 298.15 °K

Vapor phase concentration based on LEL, C_{vap} = LEL x (P/RT) x 10 mol/m^3
= 0.8175 mol/m^3

Henry's Law constant in units of (mol/m^3)/(mg/L), $H_m = H_a \times 10^3/(MW \times RT)$
=1.022 x 10^{-4}
Henry's Law constant in units of (mg/m^3)/(mg/L), $H_c = H_a \times 10^6/(RT_c)$
= 6.131

Screening level based on LEL, $C_l = C_{vap}/H_m$ = 8000 mg/L

Screening level based on PEL, C_p = PEL (mg/m^3)/H_c = 160 mg/L

Dilution factors at the edge of acute and chronic zones for various production levels

River Flow	Matsushita effluent flow for given level of production, MGD		Puyallup POTW flow MGD		Maximum dilution factors allowed			
					At edge of acute zone		At edge of chronic zone	
	No flush	with flush	Acute	Chronic	No flush	With flush	No flush	With flush
Current production level of 10,000 wafer outs per month at Matsushita Semiconductor Corporation								
7Q10 (Annual), cfs = 757	0.7	0.98	5.85	4.8	**2.9**	**2.8**	**23.2**	**22.2**
7Q20 (May-Oct), cfs = 755	0.7	0.98	5.85	4.8	2.9	2.8	23.2	22.1
7Q20 (Nov-April), cfs = 757	0.7	0.98	19	10.7	1.6	1.6	11.7	11.5
7Q20 (May-Nov), cfs = 681	0.7	0.98	5.85	4.8	2.7	2.6	21.0	20.0
7Q20 (Dec-April), cfs = 911	0.7	0.98	19	10.7	1.7	1.7	13.9	13.6
Production level of 15,000 wafer outs per month at Matsushita Semiconductor Corporation by October, 1994								
7Q10 (Annual), cfs = 757	0.85	1.13	5.85	4.8	**2.8**	**2.8**	**22.6**	**21.6**
7Q20 (May-Oct), cfs = 755	0.85	1.13	5.85	4.8	2.8	2.7	22.6	21.6
7Q20 (Nov-April), cfs = 757	0.85	1.13	19	10.7	1.6	1.6	11.6	11.3
7Q20 (May-Nov), cfs = 681	0.85	1.13	5.85	4.8	2.6	2.6	20.5	19.6
7Q20 (Dec-April), cfs = 911	0.85	1.13	19	10.7	1.7	1.7	13.7	13.4
Production level of 20,000 wafer outs per month at Matsushita Semiconductor Corporation by October, 1995								
7Q10 (Annual), cfs = 757	1	1.28	5.85	4.8	**2.8**	**2.7**	**22.1**	**21.1**
7Q20 (May-Oct), cfs = 755	1	1.28	5.85	4.8	2.8	2.7	22.0	21.1
7Q20 (Nov-April), cfs = 757	1	1.28	19	10.7	1.6	1.6	11.5	11.2
7Q20 (May-Nov), cfs = 681	1	1.28	5.85	4.8	2.6	2.5	20.0	19.1
7Q20 (Dec-April), cfs = 911	1	1.28	19	10.7	1.7	1.7	13.6	13.3
Production level of 30,000 wafer outs per month at Matsushita Semiconductor Corporation by October, 1996								
7Q10 (Annual), cfs = 757	1.3	1.58	5.85	4.8	**2.7**	**2.6**	**21.1**	**20.2**
7Q20 (May-Oct), cfs = 755	1.3	1.58	5.85	4.8	2.7	2.6	21.0	20.1
7Q20 (Nov-April), cfs = 757	1.3	1.58	19	10.7	1.6	1.6	11.2	11.0
7Q20 (May-Nov), cfs = 681	1.3	1.58	5.85	4.8	2.5	2.5	19.0	18.2
7Q20 (Dec-April), cfs = 911	1.3	1.58	19	10.7	1.7	1.7	13.3	13.0
Production level of 40,000 wafer outs per month at Matsushita Semiconductor Corporation by October, 1997								
7Q10 (Annual), cfs = 757	1.6	1.88	5.85	4.8	**2.6**	**2.6**	**20.1**	**19.3**
7Q20 (May-Oct), cfs = 755	1.6	1.88	5.85	4.8	2.6	2.6	20.1	19.3
7Q20 (Nov-April), cfs = 757	1.6	1.88	19	10.7	1.6	1.6	10.9	10.7
7Q20 (May-Nov), cfs = 681	1.6	1.88	5.85	4.8	2.5	2.4	18.2	17.5
7Q20 (Dec-April), cfs = 911	1.6	1.88	19	10.7	1.7	1.7	13.0	12.7

Effluent limits for ammonia and chlorine on annual and seasonal basis

Effluent limit calculation summary at current production levels of 10,000 wafer-outs per month								
Parameter	Basis	Dilution factors		Ambient conc. mg/L	Water quality standard		Average monthly limit (AML) mg/L	Maximum daily limit (MDL) mg/L
		acute ratio	chronic ratio		acute mg/L	chronic mg/L		
Ammonia	Annual	2.9	23.2	0.07	6.8	1.3	**12**	**20**
	Seasonal (May-Oct)	2.9	23.2	0.07	6.8	1.3	**12**	**20**
	Seasonal (Nov-April)	1.6	11.7	0.1	11.2	1.9	**11**	**18**
	Seasonal (May-Nov)	2.7	21	0.07	6.8	1.3	**11**	**18**
	Seasonal (Dec-April)	1.7	13.9	0.1	11.3	1.9	**12**	**20**
Chlorine	Annual	2.9	23.2	0.00	0.019	0.011	**0.03**	**0.06**
	Seasonal (May-Oct)	2.9	23.2	0.00	0.019	0.011	**0.03**	**0.06**
	Seasonal (Nov-April)	1.6	11.7	0.00	0.019	0.011	**0.01**	**0.03**
	Seasonal (May-Nov)	2.7	21	0.00	0.019	0.011	**0.03**	**0.05**
	Seasonal (Dec-April)	1.7	13.9	0.00	0.019	0.011	**0.02**	**0.03**

Waste load allocation (WLA) and long term average (LTA) calculations								Permit limit calculation					
Parameter	Waste load allocation (WLA)		Long term average (LTA)		LTA Coeff. var. (CV)	LTA Prob'y basis	Limiting LTA mg/L	Average monthly limit (AML) mg/L	Maximum daily limit (MDL) mg/L	Coeff. var. (CV)	AML Prob'y basis	MDL Prob'y basis	# of samples per month n
	acute mg/L	chronic mg/L	acute mg/L	chronic mg/L									
Ammonia	19.6	28.6	8.9	18.8	0.38	0.99	8.9	11.8	19.6	0.38	0.95	0.99	4.5
	19.6	28.6	8.9	18.8	0.38	0.99	8.9	11.8	19.6	0.38	0.95	0.99	4.5
	17.9	21.2	8.1	13.9	0.38	0.99	8.1	10.7	17.9	0.38	0.95	0.99	4.5
	18.2	25.9	8.3	17.0	0.38	0.99	8.3	10.9	18.2	0.38	0.95	0.99	4.5
	19.7	25.1	9.0	16.5	0.38	0.99	9.0	11.8	19.7	0.38	0.95	0.99	4.5
Chlorine	0.055	0.255	0.018	0.135	0.6	0.99	0.018	0.027	0.055	0.6	0.95	0.99	4.5
	0.055	0.255	0.018	0.135	0.6	0.99	0.018	0.027	0.055	0.6	0.95	0.99	4.5
	0.030	0.129	0.010	0.068	0.6	0.99	0.010	0.015	0.030	0.6	0.95	0.99	4.5
	0.051	0.231	0.016	0.122	0.6	0.99	0.016	0.025	0.051	0.6	0.95	0.99	4.5
	0.033	0.153	0.011	0.081	0.6	0.99	0.011	0.016	0.033	0.6	0.95	0.99	4.5

Dissolved and total metals in Puyallup River

Determination of dissolved to total recoverable frcation for certain metals																
Location	Copper (µg/L)			Cadmium (µg/L)			Zinc (µg/L)			Silver (µg/L)			Lead (µg/L)			
	TR	D	D/TR	TR	D	D/TR	TR	D	D/TR	TR	D	D/TR	TR	D	D/TR	
Mer. St. data	22.7	0.96	0.042	0.038	0.039	1.026	21	1.37	0.065				2.3	0.17	0.072	
July, 92--	3.3	1.6	0.485	0.014	0.022	1.571	34	1.42	0.042				1.2	0.08	0.068	
May, 93	32.4	1.83	0.056	0.091	0.01	0.110	33	1.63	0.049				6.3	0.14	0.022	
	1.4	1.04	0.743	0.005	0.007	1.400	<4	1.03					<.1	0.13		
	<1.0	0.81		0.006	0.003	0.500	<4	0.63					<.1	0.36		
TMDL, PUY18.0	2.1	<2		<0.1	<0.1		14	8.1	0.579	<.05	<.05		0.99	1.1	1.111	
(Sept-Oct,1990)	6.1	2.3	0.377	0.19	<0.1		15	312	20.800	<.05	<.05		1.5	0.39	0.260	
	3.5	<2		<0.1	<0.1		7.2	3	0.417	<.05	<.05		1.5	0.3	0.200	
	2.3	2.6	1.130	<0.1	0.11		9.5	4.5	0.474	<.05	<.05		1.1	0.86	0.782	
TMDL, PUY12.2	<2	2.1		0.2	<0.1		13	6.6	0.508	<.05	0.11		0.98	1.2	1.224	
(Sept-Oct,1990)	3.5	<2		<0.1	<0.1		5.3	41.9	7.906	<.05	<.05		0.83	0.49	0.590	
	11	<2		<0.1	0.11		8.3	6.9	0.831	<.05	<.05		1.3	0.7	0.538	
TMDL, PUY08.3	<2	2.9		<0.1	<0.1		6	6	1.00	0.08	<.05		0.87	1.3	1.494	
(Sept-Oct,1990)	3.5	<2		<0.1	<0.1		4	3.7	0.93	<0.5	<0.5		1.2	0.32	0.267	
TMDL, PUY05.7	<2	2.8		<0.1	<0.1		5.3	117	22.08	<.05	<.05		2.64	0.95	0.360	
(Sept-Oct,1990)	5.6	<2		<0.1	<0.1		8.1	3.6	0.44	<.05	<.05		1.4	0.79	0.564	
	<2	<2		<0.1	<0.1		5.9	5.5	0.93				2.3	1	0.435	
TMDL, PUY01.5	<2	2.7		<0.1	0.17		3.8	16	4.21	<.05	0.06		3.34	<.2		
(Sept-Oct,1990)	3.8	<2		<0.1	<0.1		6.2	4.2	0.68	<.05	<.05		1	0.92	0.920	
							5	4.6	0.92							
TMDL, PUY0.8	<2	3		<0.1	<0.1		10	7.7	0.770	<.05	0.06		1.8	<.2		
(Sept-Oct,1990)	4.8	<2		<0.1	<0.1		6.8	4.3	0.632	<.05	<.05		1.2	1.3	1.083	
	2.1	2.1	1.000	<0.1	<0.1		5	4.6	0.920	<.05	<.05		1.2	0.57	0.475	
	<2	<2		<0.1	<0.1		2.2	<2		<.05	<.05		2.3	0.35	0.152	
										0.05	<.05					
95th percentile of D/TR ratios			1.0913			1.54			20.8						1.25	

Reasonable potential calculation for exceedence of water quality criteria

Parameter	Production level: wafer-outs per month	Ambient conc. µg/L	Max Conc. at edge of: Acute mixing zone µg/L	Max Conc. at edge of: Chronic mixing zone µg/L	State water Quality Standard Acute µg/L	State water Quality Standard Chronic µg/L	Limit req'd?	CALCULATIONS: Prob'ty Basis	Pn	Effluent Max. conc. µg/L	Coeff var. CV	s	# of Samples n	Multi plier	Acute dil'n factor	Chronic dil'n factor
								Confidence level >		0.99						
Ammonia	10,000	70.00	11080.34	1458.26	6800.000	1300.000	YES	0.95	0.95	32000.00	0.4	0.39	100	1.00	2.9	23
	40,000	70.00	12081.54	1631.50	6800.000	1300.000	YES	0.95	0.95	31300.00	0.4	0.39	100	1.00	2.6	20
Chlorine	10,000	0.00	305.17	38.48	19.000	11.000	YES	0.95	0.95	885.000	0.6	0.55	100	1.00	2.9	23
	40,000	0.00	342.31	44.50	19.000	11.000	YES	0.95	0.95	890.000	0.6	0.55	100	1.00	2.6	20
Arsenic	10,000	0.00	2.24	0.28	360.000	190.000	0.00	0.95	0.32	2.000	0.6	0.55	4	3.25	2.9	23
	40,000	0.00	2.50	0.32	360.000	190.000	0.00	0.95	0.32	2.000	0.6	0.55	4	3.25	2.6	20
Cadmium	10,000	0.00	0.22	0.03	2.700	0.660	0.00	0.95	0.32	0.200	0.6	0.55	4	3.25	2.9	23
	40,000	0.00	0.25	0.03	2.700	0.660	0.00	0.95	0.32	0.200	0.6	0.55	4	3.25	2.6	20
Copper	10,000	5.60	28.51	8.49	13.000	6.500	YES	0.95	0.32	22.200	0.6	0.55	4	3.25	2.9	23
	40,000	5.60	28.29	8.55	13.000	6.500	YES	0.95	0.32	19.900	0.6	0.55	4	3.25	2.6	20
Chromium	10,000	0.00	1.45	0.18	16.000	11.000	0.00	0.95	0.32	1.300	0.6	0.55	4	3.25	2.9	23
	40,000	0.00	3.12	0.41	16.000	11.000	0.00	0.95	0.32	2.500	0.6	0.55	4	3.25	2.6	20
Lead	10,000	0.00	2.80	0.35	53.400	1.300	0.00	0.95	0.32	2.500	0.6	0.55	4	3.25	2.9	23
	40,000	0.00	3.37	0.44	53.400	1.300	0.00	0.95	0.32	2.700	0.6	0.55	4	3.25	2.6	20
Mercury	10,000	0.08	0.28	0.10	2.400	0.012	YES	0.95	0.32	0.200	0.6	0.55	4	3.25	2.9	23
	40,000	0.08	0.30	0.11	2.400	0.012	YES	0.95	0.32	0.200	0.6	0.55	4	3.25	2.6	20
Silver	10,000	0.08	2.13	0.34	2.300	10000.000	0.00	0.95	0.32	1.860	0.6	0.55	4	3.25	2.9	23
	40,000	0.08	2.08	0.34	2.300	10000.000	0.00	0.95	0.32	1.630	0.6	0.55	4	3.25	2.6	20
Zinc	10,000	8.10	49.63	13.34	88.000	59.000	0.00	0.95	0.32	39.600	0.6	0.55	4	3.25	2.9	23
	40,000	8.10	49.55	13.49	88.000	59.000	0.00	0.95	0.32	35.700	0.6	0.55	4	3.25	2.6	20

Water quality based effluent limits

Effluent limit calculation summary at production level of 40,000 wafer outs per month							Waste load allocation (WLA) and long term average (LTA) calculations							Permit limit calculation					
	Dilution factors		Ambient	Water quality standard		Average monthly limit	Maximum daily limit	Waste load allocation (WLA)		Long term average (LTA)		LTA Coeff.	LTA Prob'y		Average monthly limit	Max daily limit	Coeff.	AML Prob'y	MDL Prob'y	# of samples
Parameter	acute	chronic	conc.	acute	chronic	(AML)	(MDL)	acute	chronic	acute	chronic	var. (CV)	basis	Limiting LTA	(AML)	(MDL)	var. (CV)	basis	basis	per month
	ratio	*ratio*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*			*µg/L*	*µg/L*	*µg/L*				*n*
Ammonia	2.6	20.0	70	6800	1300	**10545**	**17568**	17568	24670	7998	16204	0.38	0.99	7998	10545	17568	0.38	0.95	0.99	4.5
Chlorine	2.6	20.0	0	19.0	11.00	**24**	**49**	49.4	220.0	15.9	116.0	0.6	0.99	15.9	24	49	0.6	0.95	0.99	4.5
Copper	2.6	20.0	2.9	13.0	6.5	**20.0**	**29.2**	29.2	74.9	9.4	39.5	0.6	0.99	9.4	19.98	29.16	0.6	0.95	0.99	1
Silver	2.6	20.0	0.08	2.3	100	**4.0**	**5.9**	5.9	1998.5	1.9	1054.0	0.6	0.99	1.9	4.01	5.85	0.6	0.95	0.99	1

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DRAFT

Effective Date: _____
Expiration Date: _____
Issuance Date: _____

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-8711

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

General Metals of Tacoma
1902 Marine View Drive
Tacoma, Washington 98422

Facility Location:

1902 Marine View Drive
Tacoma, Washington

Receiving Water:

Hylebos Waterway
Water Quality Class B

Water Body I.D. No.:

05-10-01

Discharge Location:

Latitude: 47° 22' 15" N
Longitude: 122° 16' 06" W

Industry Type:

Ferrous Scrap Metal Recycler

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is authorized to discharge in accordance with
the special and general conditions which follow.

David Jansen, P.E.
Section Manager
Toxics Cleanup Program
Southwest Regional Office
Washington State Department of Ecology

DRAFT

SPECIAL CONDITIONS

S1. EFFLUENT LIMITATIONS

A. Treated Stormwater Discharge

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee is authorized to discharge treated stormwater at the permitted location subject to meeting the following limitations:

	EFFLUENT LIMITATIONS: OUTFALL 001	
Parameter	Average Monthly	Maximum Daily
Flow	-	-
Copper	0.13 mg/l	0.17 mg/l
Lead	0.28 mg/l	0.37 mg/l
Zinc	1.09 mg/l	1.55 mg/l
PCBs	0.005 mg/l	0.007 mg/l
Oil and Grease	10 mg/l	15 mg/l
Total Suspended Solids	report, mg/l	report, mg/l
pH	6-9	6-9
[a]The average monthly effluent limitation is defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.		
[b]The maximum daily effluent limitation is defined as the highest allowable daily discharge.		

FOOTNOTES:

Outfall 001: Discharge of untreated stormwater is allowed in the case of a storm event in excess of a five year, 24-hour storm. In this case, only stormwater in excess of flow from the five year, 24-hour storm shall be discharged without treatment. The Permittee shall notify Ecology within 24 hours of the beginning of bypass. The Permittee shall supply Ecology with data to verify that the storm event received was greater than the five year, 24-storm. These data shall be supplied to Ecology within 14 days following the bypass. The Permittee shall sample the bypass flow on a daily basis. Collected grab samples shall be analyzed for copper, lead, zinc, PCBs, oil and grease, and total suspended solids.

B. Mixing Zone Descriptions

The maximum boundaries of the mixing zones for Outfall 001 which discharges treated stormwater are defined as follows:

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FACT SHEET

This fact sheet is a companion to the draft National Pollutant Discharge Elimination System (NPDES) Permit No. WA-004034-7. The Department of Ecology (Ecology) is proposing to reissue this permit which will allow discharge of treated stormwater to waters of the state of Washington.

This fact sheet explains the nature of the proposed discharge, Ecology's decisions on limiting the pollutants in the wastewater, and the regulatory basis for those decisions.

APPLICANT:	General Metals of Tacoma
FACILITY LOCATION:	1902 Marine View Drive Tacoma, Washington 98422
PERMIT NUMBER:	WA-004034-7
ACTIVITY:	Ferrous Scrap Metal Recycler
DISCHARGE LOCATION:	Latitude: 47° 22' 15" N Longitude: 122° 16' 06" W
RECEIVING WATER:	Hylebos Waterway, Class B Marine Surface Water
WATER BODY ID NUMBER:	05-10-01
PERMIT WRITER:	Mohsen Kourehdar/TCP/SWRO

SUMMARY

The existing treated stormwater NPDES permit which governs discharges into the Hylebos Waterway is being reissued. In the new permit, the previous permit's technology-based limitations for Copper, Lead, Zinc, and Polychlorinated Biphonel (PCBs) have not been changed. The evaluation of 4.5 years of discharge monitoring reports and other related documents have shown compliance with the permit requirements.

A. Description of Facility

General Metals of Tacoma (GMT) is an approximately 25-acre site which has been used as a ferrous metal scrap recycling facility since 1965. Operations primarily involve the purchase, preparation, processing, storage, and shipment of ferrous scrap. The facility annually processes and recycles 450,000 tons of scrap. In 1991, Ecology issued a Consent Decree No. 912043413 and an Agreed Order which required GMT to pave the site during 1992-1996, perform five years of semiannual groundwater monitoring, install a stormwater collection and treatment system to collect and treat the stormwater from the operations area before discharge into the Hylebos Waterway, and develop and institute best management practices to minimize or eliminate the release of hazardous substances from the site. The Mouth and Head of the Hylebos Waterway are identified as problem areas with contaminated sediment in the Record of Decision (ROD) issued by EPA, Region 10, for the Commencement Bay Nearshore/Tideflats (superfund site) in September 1989. The Consent Decree agreed to by GMT and Ecology was issued to support the source control program being implemented in Commencement Bay (superfund waterways) to eliminate or reduce the hazardous substance release into the marine environment. Approximately 20 acres of the site were paved during 1992, 1993, 1994; 4.6 acres of the site will be paved in 1995; and the remaining 0.31 acres will be paved in 1996. At the present time, the stormwater from the 20-acre paved area is collected and treated before discharge. Figure 1 in Appendix A shows the location of the site.

B. Description of Discharge

Precipitation which collects as surface water on site becomes contaminated due to contact with contaminated metals debris, by-products of the recycling operation (i.e., shredder waste), equipment, and equipment maintenance products (i.e., fuels, oils, lubricants). In the NPDES permit application submitted in 1990, principal contaminants in the stormwater were identified to be arsenic, copper, lead, zinc, oil and grease, polychlorinated biphenols (PCBs), and total suspended solids. Stormwater collected from the paved areas is collected in sumps and transferred by underground piping into two 10,000 gallon underground concrete lift stations. The stormwater treatment system consists of two 450,000 gallon and one 120,000 gallon above-ground equalization tanks equipped with skimmers for floating oil removal, a 750 gallon chemical mix tank, a 150 gallon flash mix tank, a 750 gallon flocculation tank, a liquid-solid inclined separation tank, and a sludge thickening tank followed by a filter press for sludge dewatering. The treated stormwater is discharged into the Hylebos Waterway through a diffuser. The design capacity of the treatment system is 200 gallons per minute. Figure 2 in Appendix A shows a layout of the treatment system.

The piping and the sump system on the paved area are designed to collect the peak flow for the 25 year, 24 hour storm event. The treatment system is designed to treat a five year, 24 hour storm event. The existing permit allows the discharge of stormwater exceeding the five year, 24 hour stormwater event without treatment. In the last five years, the stormwater treatment system was by-passed only once. The amount of untreated stormwater discharged was estimated to be approximately 170-200 gallons. The yearly treated stormwater discharges are estimated to be 3.0, 4.7, 6.2, and 12.7 million gallons for 1991, 1992, 1993, and 1994, respectively. Approximately 30 percent of discharge occurs during March-September and 70 percent during the remaining months.

C. Previous Permit Limitations and Monitoring Frequency

The existing permit limits for Arsenic, Copper, Lead, Zinc, and PCBs shown in Table A were developed based on a treatability study conducted for the stormwater runoff from the GMT facility. As a part of the treatability study, several treatment technologies were examined. Based on the results, it was determined that stormwater could be successfully treated using chemical coagulation/flocculation followed by sedimentation. By utilizing the treatability data from the chemical coagulation/flocculation study, the daily maximum and monthly average permit limits were calculated by using equations reported in "Technical Support Document for Water Quality-Based Toxics Control, U.S. EPA 1987. A pH effluent range of 6-9 was established. Oil and Grease effluent limits were established based on the Ecology guideline (policy). To better characterize the effluent, the Permittee was required to monitor and report the results for Total Suspended Solids, Priority Pollutant Volatile Organic Compounds, and Metals.

Table A
FINAL EFFLUENT LIMITS AND MONITORING REQUIREMENTS - OUTFALL 001

EFFLUENT LIMITATIONS			MONITORING REQUIREMENT	
Parameter	Daily Maximum	Monthly Average	Minimum Frequency	Sample Type
Flow			Continuous	Recording
Arsenic	0.54 mg/l	0.40 mg/l	Weekly	Composite
Copper	0.17 mg/l	0.13 mg/l	Weekly	Composite
Lead	0.37 mg/l	0.28 mg/l	Weekly	Composite
Zinc	1.55 mg/l	1.09 mg/l	Weekly	Composite
PCBs	0.007 mg/l	0.005 mg/l	Weekly	Composite
Oil and Grease	15 mg/l	10 mg/l	Weekly	Grab
pH	6.0 to 9.0 at all times		Continuous	Continuous
Total Suspended Solids	N/A	N/A	Weekly	Composite
Priority Pollutant Volatile Organic Compounds	N/A	N/A	2/Year	Grab
Priority Pollutants	N/A	N/A	1/Year	Composite

D. Summary of Compliance with the Previous Permit

Ecology performed inspections of the storm water treatment system in 1991 and 1993. In both inspections, grab samples were taken from the effluent by Ecology and tested for arsenic, copper, lead, zinc, PCBs, oil & grease, total suspended solids, and pH. Table B summarizes the results of Ecology's sampling results and their comparison with permit limits.

Table B

Pollutant	Ecology Results mg/l, 1991 [1]	Ecology Results mg/l, 1993 [1]	Permit Limit mg/l	
			Daily Max.	Daily Avg.
Arsenic	.002	.03	0.40	0.54
Copper	.008	.01	0.17	0.13
Lead	.02	.02	0.37	0.28
Zinc	.0265	.024	1.55	1.09
PCBs	<.0002	<.001	0.007	0.005
Oil & Grease	3.8	3	15	10
Total Suspended Solids	8	-	-	-
pH	-	7.9	6-9	6-9

(1) Ecology results for metals are total values. Ecology results in 1991 are the average of two samples.
PCBs values shown are the Method Detection limit.

The discharge monitoring reports (DMRs) were reviewed from 4/1/91 to 10/1/94. The results are shown in Figures 3 through 10 in Appendix A. As seen in Figures 3 through 10, the Permittee was in compliance with all numerical permit limits except in one case for lead and oil and grease. As Figure 3 in Appendix A shows arsenic has not been detected in method detection limits of 0.0025 mg/l and .05 mg/l in the effluent, therefore, the arsenic limits will be removed from the new permit.

The Permittee was required to test the effluent for priority pollutant volatile organic compounds (i.e., volatiles, base/neutral extractables, and pesticides) and priority pollutant metals and Cyanide. The evaluation of results did not show values that would cause water quality violations except for tetrachloroethene. The highest observed value was 12 ug/l. The reasonable potential for exceeding water quality criteria for tetrachloroethene has been investigated in Section H of this fact sheet.

E. Treatment System Performance

The previous permit required that the treatment system removal efficiency be evaluated. A total of seven influent and effluent samples were taken within a one hour interval. Table C shows the calculated removal efficiencies of the treatment system.

Table C
TREATMENT SYSTEM REMOVAL EFFICIENCY

PARAMETER	INFLUENT (mg/l)	EFFLUENT (mg/l)	TREATMENT REMOVAL EFFICIENCY (%)
Oil and Grease	8	2.4	70
Total Suspended Solids	122	22	82
Arsenic	.04	.014	65
Copper	.18	.017	90
Lead	.338	.016	95
Mercury	.00096	.00085	11
Nickel	.16	.19	--
Zinc	.93	.05	95
PCBs	.007	.00075	89

F. Acute Whole Effluent Toxicity Results

Aquatic toxicity characterization was required in the previous permit under requirements of WAC 173-205-040. Table D shows the acute whole effluent toxicity results for Daphnia Pulex, Oncorhynchus Mykiss and Fathead Minnow. The calculated median survival of the acute whole effluent toxicity results in Table D, in 100 percent effluent is approximately 97.5 percent which is higher than the median survival of 80 percent required under WAC 173-205-050. Based on the median survival value of 97.5 percent, a reasonable potential does not exist for acute toxicity conditions in the receiving water due to this discharge, therefore, acute whole effluent toxicity requirements are being removed from the new permit. The new permit will require acute whole effluent toxicity testing in the year 2000 with the permit renewal application. As seen in Table D, only the first test after start-up of the stormwater treatment system showed a mortality of 50 percent. GMT repeated the test with a fresh sample with the full dilution series of 6.26, 12.5, 25, 50, and 100 percent effluent. The results of this test are also shown in Table D (sampling date, 7/5/91). It is

important to mention that all the tests for Daphnia Pulex were run on full dilution series and only the results for 100 percent effluent have been presented in Table D. The Oncorhynchus Mykiss and Fathead Minniow test were run at 100 percenteffluent only.

Table D
SUMMARY OF GENERAL METALS OF TACOMA'S
ACUTE WHOLE EFFLUENT TOXICITY RESULTS

Sampling Date	Species	% Effluent	% Survival	LC50, (% Effluent)
5/1/91	Daphnia Pulex Oncorhynchus Mykiss	100 100	50 90	100 > 100
7/5/91	Daphnia Pulex	100	90	> 100
11/7/92	Daphnia Pulex Oncorhynchus Mykiss	100 100	100 100	> 100 > 100
1/28/92	Daphnia Pulex Oncorhynchus Mykiss	100 100	100 100	> 100 > 100
2/15/94	Fathead Minnow	100	100	> 100
2/15/94	Fathead Minnow	100(1)	100	> 100
3/29/94(2)	Fathead Minnow	100	100	> 100
1/18/95 (3)	Fathead Minnow	100	95	> 100
1/18/95 (3)	Daphnia pulex Oncorhynchus Mykiss	100 100	100 83	> 100 > 100
3/10/95	Fathead Minnow	100	90	> 100

(1) Influent sample.
(2) 10% mortality in control.
(3) Split sample between Ecology and GMT.

G. Mixing Zone Calculations

The previous permit required GMT to perform a mixing zone study to determine the dilution achieved at the edge of the chronic mixing zone. The dimension of the chronic mixing zone in the previous permit was defined as follows: "in vertical plan is one foot below the surface of Hylebos Waterway to one foot above the bottom of the waterway; in horizontal plan are a length of 150 feet on each side of the diffuser centerline and a width of 50 feet." The previous permit also required that chronic water quality standards, as referenced in WAC 173-201A-040, be met at the edge of the mixing zone. It was stated that the compliance point for the marine acute water quality criteria would be determined upon completion of the mixing zone study.

In the mixing zone study, the dilution factors were measured at approximately 50, 100, and 150 feet horizontal intervals from the diffuser centerline. In each horizontal location, the dilution was measured vertically, from approximately water surface to the depth of 36 feet (i.e., 36 feet is the depth of diffuser pipe) at approximately 3-foot intervals. The mixing zone study also determined that the effluent plume was confined between the depth of 6 to 18 feet, indicating the effluent plume was confined by density stratification. The dilution measurement above or below the depth of 6 to 18 feet was outside the effluent plume. The average dilution measured at 50 and 150 feet from the diffuser centerline were 108 to 242, respectively.

In order to determine the size of the acute mixing zone, the UM model was used. The UM model is appropriate for discharge of fresh water into salt water, for multiport diffuser ports, and for current flowing perpendicular to the diffuser pipe. The parameters which were input into the UM model to calculate the size of the acute zone were a stormwater treatment system design flow rate of 200 GPM, number of diffuser ports of four, spacing between diffuser ports, effluent salinity and temperature, diffuser depth, diffuser port diameter, diffuser pipe diameter, angle of effluent discharge, current velocity of .00001 meters/sec, and the measured Hylebos Waterway temperature and density profiles.

Table E shows the calculated average dilution values achieved at 9.3 feet from the diffuser centerline and at the edge of chronic mixing zone as defined in the previous permit.

Table E
PREDICTED DILUTIONS

Horizontal Distance from the Diffuser Centerline, ft.	Average Calculated Dilution
9.3	94
150	6874 (1)

(1) This is dilution calculated at the edge of the chronic mixing zone as defined in the previous NPDES permit.

Attempts were made to calibrate the UM model and to predict the dilution in the mixing zone and compare these values with the measured dilution values. The following conclusions were drawn:

1. The calculated and measured dilution values did not show a good agreement.

2. Both measured and modeled dilutions showed that the effluent plume achieves equilibrium with its surrounding and does not rise to the surface.

The lowest of the calculated and measured dilution values will be used to determine compliance with the Acute and Chronic Marine Water Quality Criteria. The dilution factors of 94 and 242 will be used to determine compliance with Acute and Chronic Marine Water Quality Criteria, respectively. Based on the modeling results, the edge of the acute mixing zone area is approximately 9.3 feet from the diffuser centerline and is approximately 6.2 percent of the size of the chronic mixing zone defined in the previous permit.

In order to evaluate and compare the reasonableness of the dilution values for the acute and chronic mixing zone, the calculated dilution values were compared with the calculated dilution values from another NPDES permit (i.e., NPDES permit No. WA-003726-5, Occidental Chemical Corporation) discharging into the same water body. The calculated dilution values for acute and chronic zones for the Occidental permit were 2.7 and 15.3, respectively. The model used was EPA plume model (UDKHDEN). The flow rate for the Occidental permit used in this calculation was 1.073 m3/sec. and the design flow rate used to calculate the GMT's dilution values was 0.0126 m3\sec (200 GPM, design flow of stormwater treatment system). The design flow for the Occidental Chemical is approximately 85 (1.073/0.0126) times larger than the GMT's design flow. Adjusting for the design flow difference and assuming similar flow conditions for, the dilution values of 229 for acute (85x2.7) and 1300 for chronic (15.3x85) were calculated for GMT's discharge. The purpose of this exercise was to compare qualitatively the calculated dilution values from these two permits and to verify the reasonableness of the calculated values for the GMT permit. In this case, this simple calculations showed that based on the low flow of the GMT's treatment system, the dilution values of 94 for acute and 242 for chronic are reasonable.

H. Determination of Reasonable Potential for the Water Quality Criteria Violations

Compliance with the water quality standards was evaluated by using the method outlined in Technical Support Document for Water Quality-Based Toxics Control, EPA 1991. The dilution factors of 94 and 242 were used for acute and chronic mixing zones, respectively. The maximum observed effluent concentration and daily maximum technology-based permit limits from the Table A for each parameter were used for reasonable potential determination. The results of these calculations show that water quality based permit limits are not needed for arsenic, copper, lead, zinc, PCBs, and tetrachloroethene in the new permit. The spread sheet for these calculations is presented in Figure 11 of Appendix A.

I. Ground Water

In cleanup action plan for this site, it is required that the ground water be monitored semi-annually for five years (1991-1995). At the end of five years, the monitoring results will be evaluated in accordance with WAC 173-340-720 d (i) and the approved monitoring plan. There are 20 ground

water monitoring wells in clusters of shallow (10 feet below ground surface (bgs)) and deep (30 feet bgs). The parameters that are measured are arsenic, copper, lead, nickel, zinc, PCBs, and pentacholorophenol.

J. Sediment Testing

The background sediment sampling and testing shall be performed around the outfall 001 after completion of sediment cleanup by EPA under Superfund program in Hylebos Waterway.

K. Technology-Based Permit Limitations

Based on the compliance history of this facility during the last five years (91-95) with the pervious permit limits, the previous technology-based permit limits will be retained in the new permit. The arsenic limitation has been eliminated from the new permit. Review of five years of discharge monitoring reports showed that arsenic was non-detect at both the lower and the higher detection limits (see Figure 3 in Appendix A).

Since 1991, a large amount of data have been collected and analyzed for this discharge and the Permittee has an excellent compliance history (see Figures 3 to 10); therefore, the frequency monitoring has been reduced from weekly to every two weeks in the new permit. Also the analysis of priority pollutant and volatile organic compounds has not shown any significant concentration (only tetrachloroethene was detected at 12 ug/l and was analyzed in the previous section) to cause concern for violating the water quality standards and, therefore, the priority pollutant and volatile organic compounds testing requirement have been removed from the permit. It will be required that the Permittee characterize the discharge in year 2000 when applying for a permit renewal. The permit limits and the monitoring frequencies for the new permit are in Table F.

Table F
FINAL EFFLUENT LIMITS AND MONITORING REQUIREMENTS - OUTFALL 001

EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
Parameter	Daily Maximum	Monthly Average	Minimum Frequency	Sample Type
Flow			Continuous	Recording
Copper	0.17 mg/l	0.13 mg/l	Once every two weeks	Composite
Lead	0.37 mg/l	0.28 mg/l	Once every two weeks	Composite
Zinc	1.55 mg/l	1.09 mg/l	Once every two weeks	Composite
PCBs	0.007 mg/l	0.005 mg/l	Once every two weeks	Composite
Oil and Grease	15 mg/l	10 mg/l	Once every two weeks	Grab
pH	6.0 to 9.0 at all times		Continuous	Continuous
Total Suspended Solids	N/A	N/A	Once every two weeks	Composite

L. Other Requirements

The previous permit also required that GMT submit a sediment monitoring plan, a spill prevention plan, a solid waste control plan, a treatment system operation plan, an operating/maintenance manual, and a best management practices (BMWs) plan. The Permittee has submitted these documents and they have been reviewed and approved by Ecology. A requirement will be inserted in the new permit, in case of a change in operations, that these documents would be modified to reflect the change and a copy of revised document would be submitted to Ecology for review and approval.

Figure 3: Total Arsenic Effluent Data from Discharge Monitoring Reports

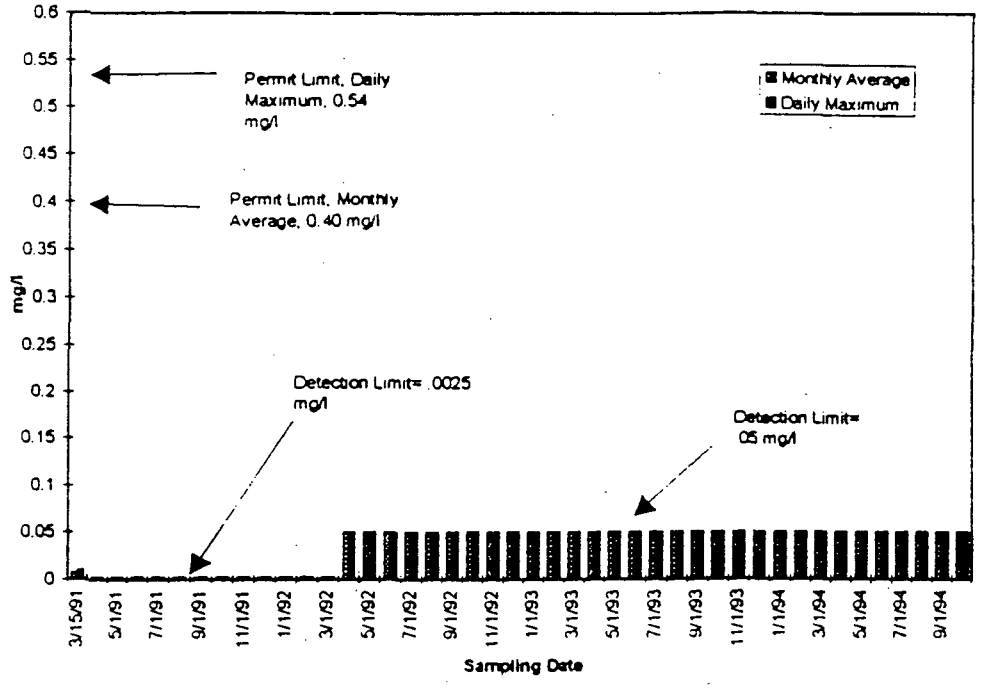
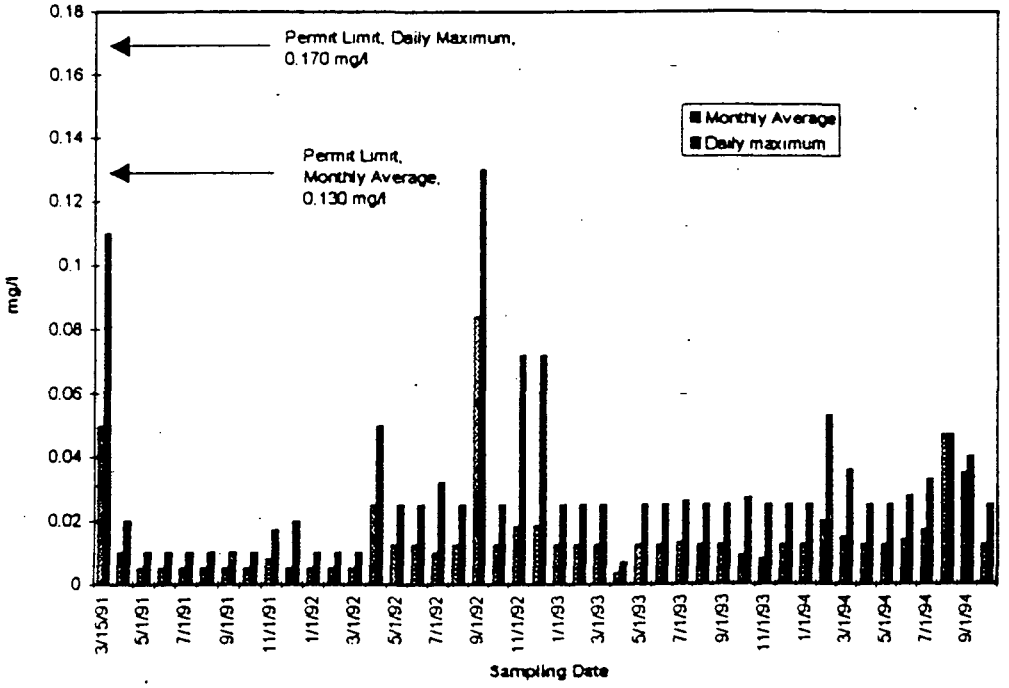


Figure 4: Total Copper Data from Discharge Monitoring Reports



REASONABLE POT[illegible]AL CALCULATION

Permit No WA-0040014-7

PARAMETER	AMBIENT CONC. ug/L	MAX CONCENTRATIO AT EDGE OF ACUTE MIXING ZONE ug/L	CHRONIC MIXING ZONE ug/L	STATE WATER QUALITY STANDARD ACUTE ug/L	CHRONIC ug/L	LIMIT REQ'D?	COMMENTS	CALCULATIONS: CONFIDENCE LEVEL > 0.95 (in decimal) PARAMETER	PROB'TY BASIS	Pn	EFFLUENT MAX CONC. ug/L	COEFF VAR CV	σ	# OF SAMPLES n	MULTI PLIER	ACUTE DIL'N FACTOR	CHRONIC DIL'N FACTOR
Arsenic		0.29	0.11	69.00	36.00	NO		Arsenic	0.95	0.93	25.00	0.60	###	43	1.0859	94	242
Arsenic		0.29	0.11	1000.00	0.14	NO	0.140 ug/l= Organi only Criterion	Arsenic	0.95	0.93	25.00	0.60	###	43	1.0859	94	242
Copper		1.50	0.58	2.50	1000.00	NO		Copper	0.95	0.93	120.00	0.60	###	43	1.0859	94	242
Lead		6.58	2.56	151.10	5.80	NO		Lead	0.95	0.93	570.00	0.60	###	43	1.0859	94	242
Zinc		4.04	1.57	84.60	76.60	NO		Zinc	0.95	0.93	350.00	0.60	###	43	1.0859	94	242
PCBs		0.00	0.01	10.00	0.03	NO		PCBs	0.95	0.93	1.50	0.60	###	43	1.0859	94	242
Tetrachloroethene		2.3	0.12	8.85	8.85	NO	.85 ug/l= Organism only Criterion	Tetrachloroethene	0.95	0.55	12.00	0.60	###	5	2.3243	94	242
									0.95	######		0.60	###		######		
									0.95	######		0.60	###		######		

Daily Max from the permit as input

Arsenic		1.1	2.4	69.00	36.00	NO		Arsenic	0.95	0.93	540.00	0.60	###	43	1.0859	94	242
Copper		1.50	0.58	2.50	1000.00	NO		Copper	0.95	0.93	120.00	0.60	###	43.00	1.0859	94.00	242.00
Lead		6.58	1.57	151.10	5.80	NO		Lead	0.95	0.93	570.00	0.60	###	43.00	1.0859	94.00	242.00
Zinc		4.04	0.58	84.60	76.60	NO		Zinc	0.95	0.93	######	0.60	###	43.00	1.0859	94.00	242.00
PCBs		0.00	0.00	10.00	0.03	NO		PCBs	0.95	0.93	0.01	0.60	###	43	1.0859	94	242

FACT SHEET

for

Draft NPDES Permit No. WA-003795-3

Facility:

Cascade Pole Company
1640 Marc Street
Tacoma, WA 98421

in

Pierce County

Discharge of storm water to Blair Waterway via Lincoln Avenue Ditch and City of Tacoma storm sewer at the following outfall:

Outfall 001: Latitude: 47° 15' 18"
Longitude: 122° 24' 30"

Discharge of storm water to Puyallup River at the following outfall:

Outfall 002: Latitude: 47° 15' 28"
Longitude: 122° 24' 51"

Objective

The purpose of this fact sheet is to explain the need for the discharge permit and the basis for its limitations and conditions. The contents of this fact sheet were derived for the renewal of National Pollutant Discharge Elimination System (NPDES) permit No. WA-003795-3, issued by the Washington State Department of Ecology allowing storm water discharges from Cascade Pole Company to state surface waters.

Public Notice

A notice will be published by Ecology, in a newspaper of general circulation within the county of the proposed discharge, to inform the public that a draft permit is now available for review and comment. Ecology will accept comments on the permit for 30 days from the date of public notice. A final determination will not be made until comments received pursuant to the public notice have been evaluated. After 30 days, Ecology may:

A. Issue the permit with some changes and a response to comments;
B. Issue the permit with no changes;
C. Hold a public hearing on the draft permit if useful information could be produced thereby or if comments indicate that there is substantial public interest; or
D. Begin a redraft of the permit because of new information received during the public notice period.

Interested persons are invited to submit written comments regarding the proposed permit. Comments should be sent to:

NPDES Permit Coordinator
Washington State Department of Ecology
Southwest Regional Office
Post Office Box 47775
Olympia, Washington 98504-7775

Any interested person may view the records and regulations relating to this permit, obtain copy of the draft permit, or request a public hearing by writing to the above address or calling (206) 753-2353.

Facility Specific Information

Background: Cascade Pole Company began its wood treating operation at the new site (East 18th Street and Marc Avenue, Tacoma, Washington) in 1974. The abandoned old Tacoma site was located at 11th Street and Port of Tacoma Road. An NPDES permit was issued to Cascade Pole Company for storm water discharges from their new site on April 28, 1975, and expired on April 28, 1980. The permit authorized the discharge of storm water from the site to Blair Waterway via City of Tacoma storm sewer and Lincoln Avenue Ditch. This outfall corresponds to the current Outfall 001. The storm water was passed through an API gravity oil/water separator before being discharged. No process water was allowed to be discharged. The total drainage area (approximately 32.52 acres, as per form 2F) is

composed of whitewood (untreated), treated pole, and treated dimensional lumber storage areas. A majority of the site is unpaved and uncovered.

On December 4, 1980, Cascade Pole Company submitted an application for renewal of their NPDES permit using EPA short form C. At that time, Ecology decided to wait for the publication of EPA's "best available technology" standards for this industry before renewing the permit and administratively extended the old permit to June 30, 1985.

An application for renewal of NPDES permit was filed with Ecology on June 16, 1989, using EPA form 2C. Two outfalls were identified in the application: Outfall 001 discharging storm water to Blair Waterway via Lincoln Avenue Ditch and City of Tacoma storm sewer, and Outfall 002 discharging storm water to Puyallup River. Discharge from both Outfall 001 and 002 contained copper, chromium, and arsenic, while pentachlorophenol was identified only for Outfall 001. Treatment of storm water from Outfall 001 consisted of oil/water separator, four anthracite mixed media filters in series, and four activated carbon mixed media filters in series. Extensive supporting chemical and biological data on both the outfalls was also submitted with the application. Upon review, Ecology determined that the application was not complete and requested additional information including data on acid/base/neutral extractable priority pollutants and identification of other possible outfalls. Data was furnished by Cascade Pole Company in December 1990 and in May 1991, a completed permit application (form 2C) was submitted to Ecology. The resubmitted application identified drainage areas (other than those for 001 and 002) discharging storm water to both Puyallup River and Blair Waterway.

On November 16, 1990, USEPA issued regulations establishing NPDES permit application requirements for storm water discharges associated with industrial activity. To comply with these regulations, Ecology requested Cascade Pole to resubmit NPDES permit application using EPA form 2F prescribed for storm water discharges associated with industrial activity. Cascade Pole submitted a new application using form 2F in April 1992. This application addressed four outfalls, three discharging storm water to Puyallup River (Outfalls 002, 003, and 004) and one to Blair Waterway via Lincoln Avenue Ditch (Outfall 001). Outfalls 002, 003, and 004 has since been combined to a single outfall labelled 002 (Thor Bendicksen, April 1, 1993, personal communications). The total drainage area for Outfall 001 is 11.92 acres of which 7.21 acres is unpaved, 4.24 acres is paved and the rest 0.45 acres consist of roofed areas ("attachment B", form 2F of NPDES permit application). Average storm water discharge for a storm event of 0.81 inches in 7 hours for Outfall 001 for October 31, 1990, was 439 gpm. For the same storm the flow at Outfall 002 was 938 gpm. The total drainage area for Outfall 002 is 25.8 acres of which 17.5 acres is paved, 7 acres is unpaved and the rest 1.3 acres consist of roofed areas ("attachment C", form 2F of NPDES permit application, as amended in a facsimile dated April 1, 1993, send by Thor Bendicksen of Cascade Pole).

Receiving water: The immediate receiving water for Outfall 001 is Lincoln Avenue Ditch and that for 002, 003, and 004 (now combined as Outfall 002) is Puyallup River. Lincoln Avenue Ditch has not been classified in WAC 173-201A-130 and as such falls under "Class A" waterbody as per WAC 173-201A-120. It may be noted that Blair Waterway the recipient of Lincoln Avenue Ditch water is designated as "Class A" water. Puyallup River from mouth to river mile 1 is designated as "Class B" waters is classified as "Class A" water body in WAC 173-201A-130. Characteristic uses of "Class A" waterbody includes water supply (domestic, industrial, and agricultural), stock watering, fish and shell fish (rearing, spawning and harvesting), wildlife habitat, primary contact recreation, commerce and navigation. "Class B" is similar to "Class A" in characteristic uses except "Class B" is designated for secondary contact

recreation instead of primary. General water quality criteria for "Class A" and Class B" requires a fecal coliform concentration not to exceed 100 colonies/100 mL and 200 colonies/100 mL, dissolved oxygen exceeding 8 mg/L and 6.5 mg/L, temperature not exceeding 18° C and 21° C, and turbidity not to exceed 5 NTU and 10 NTU over background, respectively.

Operation: Activities at Cascade Pole Company includes debarking, sizing and framing, incising, staining, treating, and distributing finished lumber products to customers. Treated wood products manufactured at the site include utility poles, pilings and dimension lumber used for decking, fencing, and other similar applications. Lumber is both pressure and dip treated with both water and oil based formulations as described below. The treating process is outlined in the addendum. Wood products are transferred in and out of treating cylinders (retort) in trams on tracks. The track pullout area is paved but uncovered. Depending on customer specifications, poles are either thermally treated with creosote or pressure treated with pentachlorophenol.

Treated pole are stored on site in "treated pole storage area" shown on site map. Dimension lumber which is pressure treated with a water borne chromated copper arsenate (CCA) solution is temporarily stored in the paved drip area north of the track pullout area. Some are then stored in the covered storage building. Excess CCA solution from treated lumber in the paved, sloped drip area drains to a catch basin which gravity-feeds to a collection sump equipped with a pump activated by a level switch. The collected material is pumped through a series of bag filters, then back into the CCA process tank for reuse.

The treating cylinders and tank farm are equipped with secondary containment which isolates the chemicals in these areas from the storm drain system. Secondary containment consists of reinforced concrete floors and walls sufficient in height to contain spills. In addition, the initial treated wood pullout area is equipped with metal drip collection pans which prevent entry of excess treating solution into the storm drain system. South of the pullout area is the butt vat used for non-pressure treatment of pole ends. The butt vat is a concrete structure approximately 13 feet below grade and was steel lined in 1984. Outfall 001 collects runoff from the main treated wood storage and the retort/dragout areas. This outfall enters the headworks of the Lincoln Avenue Ditch. Outfall 002 collects storm water from whitewood storage area, and maintenance shop area. Outfall 002 drains into Puyallup River.

Treating solutions: Medium aromatic treating oil, creosote (liquid), and CCA solution (50 percent - 60 percent concentrate in water) are delivered to the product unloading pad on site by tanker truck, where the solutions are pumped into storage tanks located in the tank farm. Pentachlorophenol is delivered in solid blocks and dissolved in the carrier oil for use. The product unloading pad consists of a reinforced concrete pad sloped to a center sump. Entrance and exit ramps form 6" berms across each end (east and west), and the entire area is covered with a roof and walls on each side (north and south). Creosote was previously used in retorts, but is currently only used in the butt vat. Ammoniacal copper zinc arsenate was also used in the past (1976-1986) to pressure treat wood at the site but has since been discontinued.

Wastewater: Sources of wastewater in a wood treating facility are discussed in the addendum. At Cascade Pole, specifically, water accumulated in the oil tank farm, or in the retort or transfer pits which contain oil or oil-based treatment processes is pumped into the settling tanks. It is then processed through separators and filters to reclaim the oil and treatment chemical for re-use; the remainder water is stored in a sump and disposed of through the evaporator system. Water accumulated in the CCA tank farms and from water-based treatment processes is pumped into the industrial water storage tank and used as make-up water for those treatment processes. During a smoke test conducted in April 1992, a non

contact cooling water discharge was located and was addressed in EPA form 2E submitted with the NPDES permit application. Since then, Cascade Pole has recycled the cooling water discharge within the facility (Mary Rutowski, letter to Ecology dated September 4, 1992).

The kiln condensate and boiler blowdown water is reused as makeup water for CCA treating solution. Laboratory wastewater is stored in drums before sending it to an approved treatment disposal and storage facility (Thor Bendicksen, April 1, 1993, personal communication). Cascade Pole does not use water seal pumps. Both storm water and vehicle wash water discharging to Outfall 001 is first treated in the treatment system identified earlier.

Expired and proposed permit: The expired permit allowed the discharge of treated storm water only from black pole storage and working areas. No process water or untreated contact storm water was allowed to be discharged. The expired permit had the following limits:

Parameter	Daily max
Total oil and grease	15 mg/L (and no visible sheen)
Total phenols	1 mg/L

The above limits were based on best professional judgement (BPJ). DMR data from July 1990 through October 1992 indicates effluent concentrations well within the above limits. It may be noted here that the total phenol analyses (method 420.2) does not detect pentachlorophenol. The current woodtreaters model permit incorporates limit on total oil and grease, pH, total suspended solids (TSS), metals (copper, chromium, arsenic, etc.), pentaclorophenol, and PAHs. Total phenols will no longer be required to be monitored. The following table shows the concentration of various parameters reported in form 2C application for permit renewal on June 16, 1989.

Outfall	pH	TSS (mg/L)	Cu (µg/L)	Cr (µg/L)	As (µg/L)	PCP (µg/L)
001	6.25-6.37	<10	1200	6600	1500	2.1
002	6.2-6.41	35	80	20	40	—

The application was determined to be incomplete and Ecology requested additional data on storm water effluent including a priority pollutant scan. On June 31, 1990, storm water discharge samples were collected at both Outfalls 001 and 002. Data indicated that all volatile organics (EPA method 8240) were below the detection limit except for acetone. Data for Outfall 001 and 002 showed acetone concentration of 15 µg/L and 18 µg/L, respectively (detection limit was 10 µg/L). Chloroform was present only in Outfall 001 in concentration of 3 µg/L (detection limit 1 µg/L).

Of the two samples from Outfall 001 that were analyzed for semi-volatile organics (EPA method 8270), only pentachlorophenol was found to be present at concentrations of 250 µg/L and 270 µg/L, respectively (detection limit 5 µg/L). Of the two samples collected from Outfall 002, one showed a pentachlorophenol concentration of 27 µg/L and the other was reported has having a concentration of < 50 µg/L (detection limit was reported as 5 µg/L). An organochlorine pesticides and PCBs analyses showed that none were present using EPA method 8080.

An analyses for metals indicated that for Outfalls 001 and 002, a maximum concentration of arsenic was at 610 mg/L and 790 mg/L, chromium at 1100 µg/L and 830 µg/L, and copper at 360 µg/L and 490 µg/L. Cadmium was present at a concentration of 0.4 µg/L and 0.8 µg/L, lead at 6 µg/L and 14 µg/L, and zinc at 60 µg/L and 260 µg/L, respectively, for Outfalls 001 and 002, respectively. Total suspended solids was reported as 33 mg/L and 77 mg/L for Outfalls 001 and 002, respectively. Total oil and grease was below detection for both the outfalls.

On February 10, 1992, Ecology collected effluent storm water samples from Outfalls 001 and 002. It was determined upon inspection that Outfall 002 not only discharged overland flow from the maintenance shop area, but also flow from interior of the facility originating in the treated wood storage area. The following table contains the sampling data.

Parameters	Concentration		
	001	002 (overland flow)	002 (deep pipe to catch basin)
pH	5.1	6.2	6.3
pH analyzed by CPC	6.77	7.03	6.85
Oil and grease (mg/L)	7	15	—
Total phenols (µg/L)	2	—	—
Pentachlorophenol (µg/L)	48	21	50
Arsenic (µg/L)	578	657	1860
Chromium (µg/L)	403	475	2140
Copper (µg/L)	371	780	2030

The effluent limits in the proposed NPDES permit are 10 mg/L for oil and grease, 50 mg/L for TSS, 9 µg/L for pentachlorophenol. Limits on arsenic, cadmium, chromium, copper and lead are 360 µg/L, 4 µg/L, 16 µg/L, 18 µg/L, and 56 µg/L, respectively. Total polynuclear aromatic hydrocarbons are limited at 100 µg/L. The pH has a limit of 6 to 9.

Other terms and conditions of the expired permit included requirements for development and submittal of an SPCC plan and a solid waste disposal plan. An SPCC plan was received by Ecology in January 1985. An update of the plan was received by Ecology in June 1989. A solid waste disposal plan was never submitted to Ecology.

Hydrogeologic site assessment as proposed in the model permit, will be required of Cascade Pole Company since the facility has a potential to impact ground water quality from storage of treated wood in unpaved areas. However, there are no underground tanks or piping and the process area is contained. In December 1987, soil samples were collected from various locations in the site and analyzed for metals, PCP, PAHs, and biotoxicity. The table below shows the results of the analyses.

Parameter	Sample locations A	B	C	D	E	F	G	DW (µg/L)
Arsenic (mg/kg)	280	720	7800	270	12	1300	1400	880
Copper (mg/Kg)	580	650	4900	520	66	2960	2960	1030
Chromium (mg/Kg)	210	360	3500	380	39	390	390	1070
Lead (mg/Kg)	34	8	29	71	49	75	60.3	102
Zinc (mg/Kg)	120	77	130	470	150	330	322	697
Pentachlorophenol (µg/Kg)	42000	72000	37000	1350	92	580	570	—
Tetrachlorophenol (µg/Kg)	3000	4200	510	310	14	450	430	—
PAHs (µg/Kg)	—	—	—	—	—	—	—	—
Bioassay test (% mortality)*	3	100	100	0	—	100	97	—

A: Shallow subsurface soil and gravel sample taken from pentachlorophenol treated pole storage area.
B: Shallow subsurface soil and gravel sample from drag out line near retorts using CCA.
C: Shallow subsurface soil and gravel sample from drag out line near retorts using pentachlorophenol.
D: Sediment sample from sump discharging storm water to Puyallup River.
E: Shallow subsurface soil sample collected from drainage ditch, west end of north fence line.
F & G: Samples collected from same spot in treated lumber storage area along north fence line.
DW: Muddy water sample from sump discharging storm water to Puyallup River.

*Bioassay tests were conducted on a 1000 ppm concentration of soil in test water. For samples B,C,F, and G a 100 ppm concentration was also tested and determined to show 0 percent, 0 percent, 13 percent, and 10 percent mortality, respectively.

Freshwater sediment monitoring is proposed in the model permit. Baseline information for the development of freshwater sediment standards is currently being compiled by Ecology and can be found in two documents titled "Summary of Criteria and Guidelines for Contaminated Freshwater Sediments" (September 1991) and "Evaluation of Bioassay Organisms for Freshwater Sediment Toxicity Testing" (February, 1992). Both of these documents were authored by Jon Bennett and Jim Cubbage of Environmental Investigations and Laboratory Services, Washington State Department of Ecology.

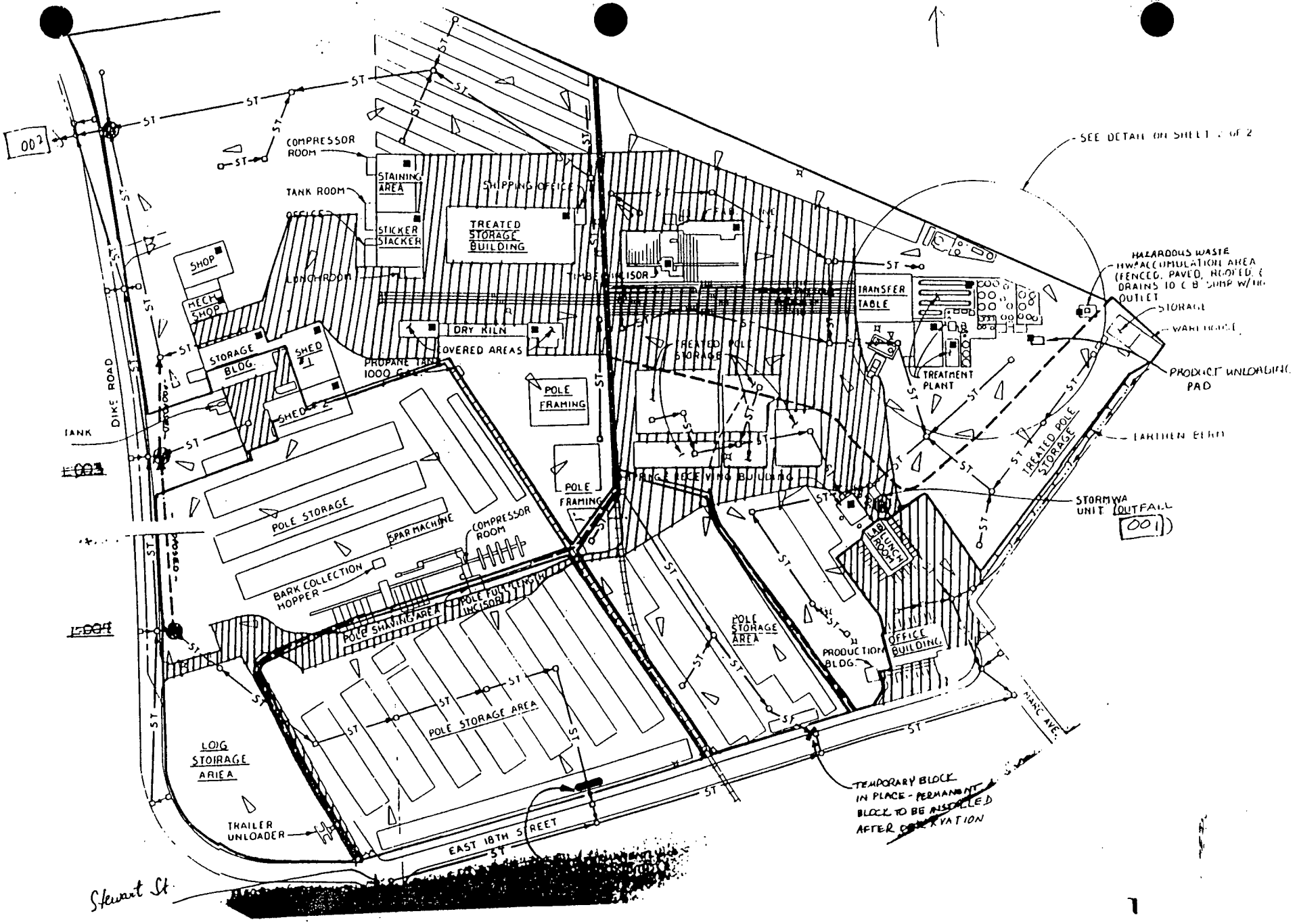
Several approaches are discussed in these citations to develop freshwater sediment standards for metals. First approach is to compare contaminated levels in the impacted sediment to that of the background level (which would be pre-industrial value for metals). This approach would strive to reduce metals in sediments to background levels. The second approach, called the Screening Level Concentration Approach, is to set sediment metals criteria at a level that can be tolerated by 95 percent of the benthic infaunal species. A third approach in setting metals criteria is the spiked bioassay approach, which is based on a dose response relationship of test organisms to levels of contaminants in the sediment. Other approaches are also listed. The table presented below shows sediment standards for metals adopted by various regulatory agencies.

Metals (mg/Kg dry)	A	B	C	D
Arsenic	6	10	17	<3
Chromium	26	100	100	<25
Copper	16	100	85	<25
Lead	31	50	55	<40

A: Ontario Ministry of the Environment, Provincial sediment quality criteria based on lowest-effect level, or level of sediment contamination that can be tolerated by most benthic organisms.
B: Wisconsin Department of Natural Resources, criteria based on background approach for in-water disposal of dredged material.
C: Beak consultants sediment guidelines, arsenic criteria based on screening level concentration approach, cadmium and chromium criteria based on spiked bioassay approach, and lead criteria based on background approach.
D: EPA region V, criteria for non-polluted harbor sediments.

The above-cited reports also recommended that *Hyalella azteca*, *Hexagenia limbata*, and Microtox be used for freshwater sediment bioassay. Ecology is currently investigating and developing freshwater sediment criteria and the Permittee will be required to comply with sediment standards soon as they are available.

U.S. Department of Interior, Fish and Wildlife Services reported metal concentrations in sediments of Gibbons Creek both upstream and downstream of the Camas/Washougal Industrial Park. The report is titled "Reconnaissance Investigation of Contaminants on the Steigerwald Lake National Wildlife Refuge" dated October 1992, and authored by E.J. Materna, C.A. Schuler, R.L. Garst, and J.R.Clapp. Arsenic levels increased from 0.97 -0.72 μg/g (=mg/Kg) upstream of the Industrial Park to 17 μg/g downstream in Gibbons Creek sediments. Chromium levels increased from 19 -39 μg/g to 76-79 μg/g and Copper from $<$0.5-11 μg/g to 26-28 μg/g in Gibbons Creek sediment samples obtained upstream and downstream of the Camas/Washougal Industrial Park. Lead sediment concentration in upstream and downstream samples were either similar or were below detection. The concentration of arsenic, chromium, and copper in the Gibbons Creek sediments are within those known to effect sensitive benthic organisms. Implementation of best management practices (BMPs) would help in reducing the levels of these metals. Allweather Wood Treaters is located in the Camas/Washougal Industrial Park and discharges contact storm water to the Gibbons Creek. Storm water data contained in DMRs as well as in the application for permit renewal, indicates presence of these metals in high concentrations. Exterior Wood Inc. is also located in the Industrial Park. Both Allweather and Exterior use water-based CCA solutions to treat wood. There is thus a potential for Cascade Pole to contribute copper, chromium, arsenic, and even pentachlorophenol, and PAHs to both Puyallup River and Lincoln Avenue Ditch sediments. Cascade Pole will thus be required to conduct sediment monitoring near their outfalls both in the Puyallup River and in Lincoln Avenue Ditch. This will ensure the effectiveness of BMPs and generate a baseline to indicate partitioning of chemicals between the sediments and the water column.


002
COMPRESSOR ROOM
STAINING AREA
TANK ROOM
OFFICE
STICKER STACKER
SHIPPING OFFICE
TREATED STORAGE BUILDING
SHOP
MECH SHOP
LUNCHROOM
TIMBER INCISOR
TRANSFER TABLE
DRY KILN
COVERED AREAS
STORAGE BLDG.
SHED #1
SHED #2
PROPANE TANK 1000 GAL
POLE FRAMING
TREATED POLE STORAGE
TREATMENT PLANT
DIKE ROAD
TANK
E 003
POLE STORAGE
SPAR MACHINE
COMPRESSOR ROOM
BARK COLLECTION HOPPER
POLE FOLLOWING INCISOR
POLE SHAVING AREA
POLE FRAMING
RAILROAD RECEIVING BUILDING
IRRIGATED POLE STORAGE
AB LUNCH ROOM
POLE STORAGE AREA
OFFICE BUILDING
PRODUCTION BLDG.
POLE STORAGE AREA
LOG STOIRAGE ARIEA
TRAILER UNLOADER
EAST 18TH STREET
MARC AVE.
Stewart St
SEE DETAIL ON SHEET 2 OF 2
HAZARDOUS WASTE
HW ACCUMULATION AREA
(FENCED, PAVED, ROOFED, &
DRAINS TO C.B. SUMP W/ NO
OUTLET
STORAGE
WAREHOUSE
PRODUCT UNLOADING PAD
EARTHEN BERM
STORMWATER UNIT
OUTFALL 001
TEMPORARY BLOCK IN PLACE - PERMANENT BLOCK TO BE INSTALLED AFTER EXCAVATION

Addendum

FACT SHEET

FOR THE

MODEL WOOD PRESERVING NPDES PERMIT

Prepared by:
The Point Source Section
Department of Ecology
January 15, 1993

TABLE OF CONTENTS

INTRODUCTION

The intent of this permit and fact sheet is to apply the federal national pollutant discharge elimination system (NPDES) permit requirements under the Federal Water Pollution Control Act (33 U.S.C. § 1251) and the state waste discharge permit requirements, under chapter 90.48 RCW to the pressure wood preserving industry in Washington state. This permit is intended to satisfy both the technology and water quality based requirements of both state and federal permit programs, including recent NPDES storm water permit requirements.

The department of Ecology has determined that coverage of the pressure wood preserving industry under a general permit including the storm water baseline general permit is not appropriate. Because of the toxicity of the treating chemicals, potential for environmental release, their environmental persistence and past environmental problems, the issuance of individual permits is warranted for this industry. A model permit has been developed for this industry because of the similarity of issues and concerns between facilities. It is intended that this model permit be used as a starting point and that additional site specific permit conditions beyond those contained in this permit may be required for individual facilities.

1. INDUSTRY DESCRIPTION

There are eleven identified operating pressure wood preserving facilities in Washington State. At least five others are no longer operational and are in various stages of clean-up or conversion to other uses. Historically, wood preserving facilities have almost universally resulted in significant environmental problems as a result of poor operating practices.

Past experience has shown that without proper design and operation, wood preserving facilities pose a significant threat to human health and the environment through both catastrophic spills and routine day-to-day operations. The intent of this permit is to minimize the threat to human health and the environment that wood preserving facilities pose through the imposition of a combination of effluent limits and best management practices.

A. LOCATION, DISTRIBUTION, AND SIZE

All eleven identified operating wood preserving facilities in Washington State are located west of the Cascades where average annual rainfall is typically between 30 and 45 inches. They range in age from less than 5 years to more than 50 and in size from about 5 acres to more than 40.

There is a wide range in products treated, from dimensioned lumber such as decking to

telephone poles and specialty items such as cross arms, plywood, and shingles. The products treated, to a large extent, are market dependent with most facilities treating on order.

TABLE 1.

EXISTING PRESSURE WOOD PRESERVERS IN WASHINGTON STATE		
FACILITY	LOCATION	TREATMENT PROCESS
Chemco	Ferndale	Inorganic
Brooks Manufacturing	Bellingham	Organic
The Oeser Company	Bellingham	Organic
Wyckoff	West Seattle	Inorganic
J. H. Baxter	Arlington	Organic
Western Wood Preserving	Sumner	Inorganic
Superior Wood Treating	Sumner	Inorganic
Cascade Pole Company	Tacoma	Inorganic & Organic
Pacific Wood Treating	Ridgefield	Inorganic & Organic
Allweather Wood Treaters	Washougal	Inorganic
Exterior Wood Treating	Washougal	Inorganic

Along with the wide range in both size and age, there is a wide range of site conditions. For example some of the facilities are entirely paved. This includes processing areas, tank farms and a large portion of the treated product storage areas. In addition to paving, some facilities have covered some or all of the processing areas, tank farm and treated product storage areas. Most of the older and larger facilities are almost entirely unpaved, treated product storage areas are uncovered and in some cases the process areas are also entirely uncovered.

The industry can be divided into two segments depending upon treating processes employed. Facilities which treat with organic based preservatives such as creosote or pentachlorophenol are more likely to be pole treaters or to treat heavy timbers. Facilities which treat with inorganic based preservatives such as the chromium, copper, and arsenic based treatments are more typically involved with treating dimensioned lumber or specialty products, although poles and timbers may be treated also.

B. PRESSURE TREATING PROCESS

The wood preserving process involves forcing a wood preservative into the wood being treated using a combination of vacuum and pressure. The amount of preservative retained and the depth to which the preservative is forced into the wood is dependent upon the specifications for the product being treated. Generally the more severe the environmental exposure of the final treated product, the greater the penetration and the higher the preservative retention required.

Prior to treatment, raw wood must be conditioned to reduce the moisture content of the wood. Conditioning of the raw wood may be accomplished several different ways. The two most common are the use separate drying kilns or the use of a treating process which includes conditioning steps.

The use of separate drying kilns to reduce the moisture content of the wood prior to treatment is common for facilities which use inorganic wood treatments. These facilities will either purchase kiln dried wood for treatment or in some cases purchase green dimensioned lumber and specialty products such as shingles and kiln dry them on site. Poles are typically conditioned within the treating cylinder or retort.

The operation of a wood preserving facility begins with the delivery of the raw wood or white wood. Dimensioned lumber, such as; 2x4's, 2x6's, etc., are usually delivered to the facility by either truck or in some cases rail car. Dimensioned lumber may be immediately treated or stored on site for up to several months. Dimensioned lumber may be treated in the condition it arrives at the facility, or it may undergo one or several manufacturing processes prior to treatment, for example, it may be incised, re-stacked, drilled, or re-sawn prior to treatment. In general, the pre-treatment manufacturing processes do not generate waste water with the exception of conditioning.

Delivery of poles to the treatment facility is also by truck or rail car. The inventory of white wood or untreated poles at a pole treater is typically quite large. The area required for white wood storage at a pole treater is greater than at a facility that treats primarily dimensioned lumber. Poles are usually trimmed and de-barked just prior to treatment, generating significant quantities of wood waste. This wood waste is used to generate steam for the treating process and ancillary activities or sold for use by others as hog fuel.

The treating process takes place within a retort which is a pressure cylinder usually 6-8 feet in diameter and 50 to 150 feet long. The retort is mounted horizontally with a hinged door at one or both ends. A pair of tracks run the length inside of the cylinder and are used to move the wood in and out of the cylinder. The wood is loaded onto trams by fork lift or large log handlers in the case of poles. One or more trams are connected together and the whole unit, trams and all, are pushed into the retort. The treating process within the retort can take from several hours to more than a day, depending upon the species of wood being treated, whether the conditioning of the wood is being done within the retort, and the preservative retention and penetration

required.

There are several different combinations of vacuum and pressure currently in use to force the preservative into the wood. Most current processes employ a final vacuum prior to removal of the wood from the retort to remove as much excess preservative from the wood as possible. Upon removal from the retort, the treated product is kept on a drip pad to collect any excess preservative or kick-back. The requirement for a drip pad, its specifications and operating requirements are all part of a recent EPA rule-making effort (40 CFR Parts 260, 264, and 265). Treated product is required to remain on the drip pad until it has "ceased dripping", whereupon it is transferred to the treated product storage yard. The time the treated product may remain in the storage yard is variable from several days to several months and may be as long as several years for products which do not meet specification.

Treated product is shipped from the treating facility by both truck and rail with rail being the predominate method for poles.

2. WASTE WATER SOURCES

The waste water sources within a wood treating facility can be divided into two categories; waste water associated with the treating process and contaminated storm water.

A. PROCESS WASTE WATER

Waste waters associated with the treating process at wood treating facilities are variable both in quality and quantity, depending upon the treating process employed. Generally, the largest single source of process waste water results from the conditioning of the wood prior to, or at the beginning of the treatment process. The quantity of waste water generated by a wood preserving facility is a function of the method of conditioning used and the moisture content and species of the wood to be treated.

The pressure treating process involves the forcing of the treating chemicals deeply into the wood using various combinations of vacuum and pressure. When green or wet wood is treated, wood moisture must be reduced to allow the penetration of the treating chemicals onto the cells. The quantity of wood moisture generated as a result of the treating process is highest when wet-wood is treated.

Dimensioned lumber is generally kiln dried prior to treatment. The kiln drying operation does generate a waste water stream. This waste water is high in phenols and extracted wood sugars. The wood sugars result in a high chemical oxygen demand (COD). Since the kiln drying operation is separate from, and occurs prior to the treating operation, kiln drying waste waters should not be contaminated with treating chemicals.

Pole treating operations usually generate substantially more waste water since most poles are not dried prior to treating, and moisture is removed from the poles in the retort.

Water removed from the wood prior to or at the beginning of the treatment process may be used for make-up water in inorganic treating solutions. Facilities treating with inorganic salts are net water users while facilities which utilize organic based treatment processes are unable to utilize water removed from the wood as a solution make up.

If an organic treater conditions the wood in the retort, waste waters associated with the conditioning process will be contaminated with the treating chemicals in use at the facility.

The practices currently in use to attain zero discharge of waste waters generated as a result of conditioning of the wood prior to treatment include the use as treating solution make-up water for facilities which treat with inorganic salts. For facilities which treat with organic based treatments, most evaporate all conditioning waste waters.

B. STORM WATER

Storm water contamination is the primary concern from wood treating facilities. Data indicates that storm water runoff from wood treating facilities, primarily treated lumber storage yards, frequently exceeds acute and chronic criteria from many of the treating solution constituents in use at the facilities. Elevated levels of several metals, pentachlorophenol and creosote constituents of have been found in storm water associated with treated lumber storage areas.

An Ecology Class II inspection of Pacific Woodtreating Corporation in the winter of 1986-87 found storm water to contain elevated levels of the major constituents of the treating formulations in use at the facility. The inspection found that total copper and chromium levels exceeded the acute criteria for all samples tested as did pentachlorophenol. The metals sampled in the Class II inspection were analyzed using a more vigorous total metals method. The aquatic life criteria are based upon the more bioavailable total recoverable metals.

The Class II inspection report also includes the results of both acute and chronic bioassays done on storm water samples. The results found "Both acute and subacute (chronic) toxicity was very pronounced in the outfall samples". Results ranged from 0% survival in 65% storm water for trout, an NOEC of 3% storm water for *ceriodaphnia* and 98% inhibition in 100% storm water for *Selenastrum* for treated wood storage area storm water.

An Environment Canada report published in August of 1987 entitled Assessment of Storm Water Related Chlorophenol Releases From Wood Protection Facilities in British Columbia found high levels of chlorophenols and acute salmonid toxicity from virtually 100% of the storm water samples tested. The report studied surface protection (dip or spray treated) facilities only. The report found that whenever there was measurable rainfall there were measurable levels of chlorophenols in the runoff. The chlorophenol levels in storm water runoff ranged from 1968 to 6600 ppb.

The limited NPDES application data received so far on storm water runoff from treated

wood storage area storm water indicates the discharge of metals and pentachlorophenol are at levels which exceed acute criteria. At one facility storm water pentachlorophenol levels were reported to be 270 µg/L.

EPA as part of the recent hazardous waste listing effort published values for preservative formulation drippage. The values published (53 FR 53292-94) all were in excess of acute criteria, in many cases by several orders of magnitude.

The quantities of contaminated storm water that can be generated are significant. Treated lumber storage yards range in size from 1-2 acres to about 30 acres. Assuming an annual rainfall of 40 inches, a one acre site will generate annually between 0.6 and 1.0 million gallons of storm water runoff depending upon the amount of infiltration. Similar quantities of storm water runoff are generated from untreated or white wood storage areas.

Storm water associated with the retort, tank farm, and drip pad areas is usually highly contaminated and is typically recycled back into the treating process or evaporated. Storm water quantities generated from the process area are highly variable ranging from zero for facilities with totally covered process areas to close to one million gallons per year for a large facility with uncovered tanks and processing areas. As a result of EPA's recent hazardous waste listings, any storm water falling within the retort, tank farm and drip pad area is likely a hazardous waste since the mixture of the storm water with a listed waste is almost inevitable.

C. OTHER SOURCES OF WASTE WATER

Other sources of waste water from pressure wood treating facilities may include boiler blow down, drying kiln condensate, vehicle wash and maintenance activities, water seal vacuum pumps, laboratory waste waters, and sanitary wastes.

For facilities with boilers, boiler blow down should be either incorporated as process make-up water, evaporated or discharged to a sanitary sewer system. Direct discharge of boiler blow down is prohibited.

Drying kiln condensate should be treated similar to boiler blow down because of the relatively small volumes typically generated and the high concentration of wood sugars and phenols. Direct discharge of drying kiln condensates is prohibited.

Vehicle and equipment wash and maintenance activities can be a source of waste water from some facilities. The quantities of waste water generated due to vehicle wash and maintenance activities is highly variable and site specific. Pollutants of concern are primarily oil and grease. However, all the constituents of the treating solutions in use at the facility can be expected to be present, since equipment used to handle treated product are maintained along with uncontaminated equipment. The use of detergents, oil dispersants, or emulsifiers is prohibited since the primary mechanism for oil and grease removal is through the use of an oil water separator. Oil water separators are ineffective in removing emulsified oils.

Some facilities still utilize water seal vacuum pumps to produce a vacuum on the retort. Waste waters associated with water seal vacuum pumps are considered process waste water and are subject to a zero discharge requirement.

3. POLLUTANTS OF CONCERN

Generally, the pollutants of concern from wood pressure treaters are dependant upon the treatment process employed. For facilities which treat with inorganic salts, soluble metals are the primary pollutants of concern. Of secondary concern are ammonia, phosphates, fluorides, and borates from the various fire retardant formulations. For facilities which employ pentachlorophenol as a wood treatment, pentachlorophenol and various polynuclear aromatic hydrocarbons (PAH's) from the treating solution carrier oils are the pollutants of concern. For creosote treating processes, the pollutants of concern are the various polynuclear aromatic hydrocarbons which make up the creosote treating solutions.

For a given wood treating process, the matrix of pollutants of concern is not expected to change significantly from facility to facility. However, for a given wood treatment process employed, the expected storm water pollutant loading will differ between facilities and within a single facility.

Chromated copper arsenate (CCA) treating solutions are typically prepared from a concentrate which is delivered in bulk to the treating facility. The bulk concentrate consists of approximately 25% CrO_3, 9% CuO, and 17% As_2O_5. The concentrate is diluted with water, storm water, or process waste water to produce a working solution. The work solution consists of between 1 and 7% total oxides, depending upon the product to be treated. A 2% work solution contains approximately 4900 ppm Cr, 3000 ppm Cu, and 4400 ppm arsenic.

Ammoniacal copper arsenate (ACA), sometimes referred to as "chemonite", treating solutions are also typically prepared on site. Copper oxide and arsenic acid (75%) are delivered in bulk or drums. Aqua ammonia (29%) is delivered in bulk.

> "ACA is first prepared as a concentrate (usually from 8 to 12% total oxide as CuO and As_2O_5). The concentrate is prepared by initially adding a known quantity of copper to a measured amount of water in a mix tank to form a slurry. Aqueous ammonia is then added to give an NH_3:CuO ratio of 1.5 to 3.5 by weight. Arsenic acid is then added below the solution surface level in order to effect immediate acid neutralization and to prevent contact of the highly corrosive arsenic acid with the body of the mix tank. Air is drawn into the mix tank by an agitator, which causes copper oxidation; copper, in its oxidized state, reacts with arsenic and ammonia to form a soluble complex. A rapid temperature rise occurs during the reaction, and mixing generally continues one hour after the maximum temperature is reached. A clear blue solution will result. A sample is then removed and submitted for analysis to assess the completeness of copper oxidation. The solution is subsequently diluted with water to form working solutions that contain 2 to 3% total oxides." (Environment Canada 1988)

Pentachlorophenol treating solutions are usually prepared on site by dissolving pentachlorophenol in a petroleum oil. The pentachlorophenol is usually delivered in 1000-2000 lb blocks wrapped in plastic. The petroleum oil is usually delivered by tank truck or rail car. A 3 to 6% pentachlorophenol working solution is prepared by placing the pentachlorophenol blocks either in the retort or in a tank specifically designed to dissolve the pentachlorophenol blocks. Hot petroleum oil is then recirculated over the blocks to dissolve them. Once dissolved, the pentachlorophenol working solution is stored in large tanks until it is needed in the treating process.

Creosote wood preservation facilities typically use either a 50:50 mixture of creosote/petroleum oil or creosote alone. In either case, the creosote is delivered in bulk by tank truck or rail car. The use of a creosote petroleum oil mixture results in lower treating costs and better penetration of the creosote.

TABLE 2.

COMPONENTS OF A BATCH OF CREOSOTE

COMPONENT	PERCENT
Naphthalene	17.5
Phenanthrene	10.2
Fluoranthene	9.9
Acenaphthene	5.6
Fluorene	5.1
Pyrene	4.4
Anthracene	2.3
Carbazole	2.1
Acenaphthylene	2.0
Benzo(a)anthracene	1.1
Chrysene	1.0
Benzo(b)fluoranthene	0.6
Benzo(k)fluoranthene	0.4
Dibenzo(a,h)anthracene	0.2
Benzo(ghi)perylene	0.1
Indeno(1,2,3-cd)pyrene	0.1

(Environment Canada 1988)

Creosote is composed primarily of polynuclear aromatic hydrocarbons (PAH's). Other components of creosote include phenols, cresols, cresylic acid, pyridines, quinolines, and acridines. The following table lists the major components of a batch of creosote. The constituents and their concentrations in creosote are variable. Because of this the physical, chemical, and toxic properties of creosote can only be generalized.

Storm water run-off from treated wood storage areas is contaminated due to leaching of the preservative directly from the treated product and due to contact with contaminated soils. Pollutant loadings in storm water are variable depending upon storm intensity, duration, and time from last rainfall event. In addition to the amount of treated product exposed, how the treated lumber is stacked and the condition of the storage yard all impact storm water quality.

An Ecology Class II Inspection of a large pressure treating facility in 1986 and 1987 found that acute criteria for copper, chromium, and pentachlorophenol were all exceeded in storm water run-off from the treated lumber storage area. Storm water run-off from this area also exhibited pronounced acute and chronic toxicity.

An Environment Canada study during the same time period found similar results from five saw mills and two lumber export terminals where lumber dip treated with chlorophenols was exposed to storm water. The study found that whenever there was measurable rainfall at the treated lumber storage yard there were measurable chlorophenols in the run-off. Static bioassays with rainbow trout in 100% storm water run-off resulted 100% mortality within 120 minutes. (Environment Canada, August 1988)

4. EFFLUENT LIMITATIONS

A. PROCESS WASTEWATER

Process Wastewater is defined in 40 CFR Part 429.11 as part of the effluent guidelines for this industry. "The term 'process wastewater' specifically excludes non-contact cooling water, material storage yard runoff, (either raw natural or process wood storage), and boiler blow down..."

For the purposes of this permit, process wastewater includes all waste waters generated as part of the conditioning of the wood in the treatment cylinder. Other sources of process wastewater include, but are not limited to preservative formulation; recovery and regeneration wastewater; water used to wash excess preservative from the surface of preserved wood; and condensate from drying kilns used to dry preserved or surface protected lumber. Any rainwater or storm water which falls in the retort area, drip pad area, or tank farm area is also considered process wastewater. Storm water from white wood or treated product storage areas is generally not considered process wastewater and is specifically addressed elsewhere in this permit.

The United States Environmental Protection Agency (EPA) has promulgated effluent guidelines and standards for the timber products processing point source category, the category under which wood preserving falls. Under 40 CFR part 429, the wood

preserving industry has been divided into four subcategories: subpart F - wood preserving - water borne or non-pressure sub-category; subpart G - wood preserving - steam subcategory; and subpart H - wood preserving - Boulton subcategory.

The water borne or non-pressure subcategory would include facilities which employ water borne inorganic salts in their treatment processes. This includes all the CCA and fire retardant treaters. Effluent limitations representing BPT and BAT for all direct dischargers within this subcategory are zero discharge of process wastewater pollutants into navigable waters. Indirect dischargers, or wood treating facilities which discharge process wastewater into a publicly owned treatment works must comply with the requirements in 40 CFR Part 403. 40 CFR Part 403 contains the general pretreatment regulations for existing and new sources of pollution.

Subpart G, the wood preserving steam subcategory, includes "All wood preserving processes that use direct steam impingement on wood as the predominant conditioning method; processes that use the vapor drying process as the predominant conditioning method; direct steam conditioning processes which use the same retort to treat with both salt and oil-type preservatives; and steam conditioning processes which apply both salt-type and oil-type preservatives to the same stock." No known Washington wood preservation facilities fall within this subcategory.

Subpart H, the wood preserving Boulton subcategory, includes those wood preserving facilities which use the Boulton process as the predominant method of conditioning stock prior to treatment. All known wood treating facilities within Washington State which pressure treat wood with PCP or creosote fall within this subcategory. Effluent limitations representing BPT and BAT for all direct dischargers to waters of the United States under 40 CFR Part 429 require that there be no discharge of process wastewater pollutants into navigable waters. There is one known wood treater in Washington State which discharges to a publicly owned treatment works. This facility is subject to the pretreatment standards for existing sources contained in 40 CFR Part 429.95, and currently has a pretreatment permit issued by Metro.

The effluent guidelines were adopted by EPA on January 26, 1981. The effective date by which all dischargers were to be in compliance with the zero discharge BAT requirements for process waste waters was three years from the adoption date, or January 26, 1984.

The State requirement for the application of all known available and reasonable methods to prevent and control pollution (AKART) of waters of the State under RCW 90.48, 90.52 and 90.54 is satisfied by the application of the Federal Effluent Limitation for Process Waste waters Requiring Zero Discharge of Process Waste waters.

B. STORM WATER

Storm water runoff associated with raw material and treated product storage yards were specifically not addressed in the effluent limitation guidelines promulgated by EPA for this industry in 1981. This permit divides storm water into three categories based upon

the areas of contact and potential for contamination: 1. Storm water associated with the retort, drip pad, and tank farm areas; 2. Storm water associated with treated product storage areas; and 3. Storm water associated with white wood storage areas.

I. Storm water associated with the retort, drip pad, and tank farm areas is subject to Federal Effluent Guidelines which Require Zero Discharge of Process Wastewater Pollutants. With EPA's recent listing as hazardous waste any preservative drippage, storm water falling within or running onto the tank farm, retort or drip pad area is considered a hazardous waste.

Methods of achieving zero discharge include prevention by roofing or otherwise eliminating storm water contact with the tank farm, retort and drip pad areas, recycle or evaporation of collected storm water. Recycling storm water from the process area involves using the storm water as solution make-up water in water borne treatment processes. Evaporating process area storm water after oil water separation is most commonly utilized by facilities which treat with oil based preservatives such as pentachlorophenol and creosote. Evaporation of process area storm water is subject to local air pollution control authority permits and permit conditions.

II. Storm water associated with treated product storage areas; these areas include all areas over which treated products are transported, between the retort-drip pad area and the treated product storage area in addition to the treated product storage areas.

Pollutants of concern associated with treated product storage area storm water vary with the types of wood treatments applied. Pollutants of concern which are common to all treating facilities regardless of the wood treatments applied are total suspended solids and total oil and grease.

For facilities which use CCA, chromium, copper, arsenic, and lead are the pollutants of concern. For facilities which use Ammoniacal Copper Arsenate (ACA), ammonia, copper, arsenic, and lead are of concern.

Facilities treating with fire retardants utilize various formulations of inorganic salts, the principal ones being borates, phosphates, and ammonium compounds. Pollutants of concern are dependant upon the specific formulations in use at the facility in question.

For facilities treating with pentachlorophenol, the storm water pollutants of concern are pentachlorophenol (PCP) and polynuclear aromatic hydrocarbons (PAH) from the carrier oils. The primary storm water concerns with creosote wood treatment facilities are PAH's.

C. TREATED WOOD STORAGE AREA STORM WATER EFFLUENT LIMITS

Permit limits for treated product storage area storm water are a combination of

technology based and water quality based limits depending upon the pollutant. Technology based limits are based upon a best professional judgment application of the appropriate criteria contained in 40 CFR 125.3. (See appendix 1)

Effluent limits for treated wood storage area storm water are dependant upon the facilities potential to cause a violation of the appropriate standard. For pollutants which would be controlled through water quality based limits (pH, pentachlorophenol, arsenic, cadmium, chromium, copper, and lead), the standard is a reasonable potential to cause or contribute to an excursion above any state water quality standard (40 CFR 122.44(d)). For pollutants which would be controlled through technology based limits (oil and grease, total suspended solids, and polynuclear aromatic hydrocarbons), the standard is based upon information which indicates the pollutants are or may be discharged at a level greater than which can be achieved by technology-based treatment requirements (40 CFR 122.44.(e)).

Various options are available for use by wood treaters to control the discharge of TSS, oil and grease, pentachlorophenol and PAH's from treated lumber storage areas. There are several options available to reduce the pollutant levels in storm water. The options include both end-of-pipe technologies and pollution prevention measures. The end-of-pipe treatment technologies available include; sedimentation basins, metal precipitation and clarification, oil-water separators, multi-media filtration and, carbon filtration. Some of the pollution prevention options include; roofing, paving, plastic or similar covers over individual units or poles and the implementation of best management practices to control preservative drippage and leaching in the storage yard. These control technologies can be used singularly or in combination as necessary to achieve permit compliance.

I. Technology based effluent limits

Technology based effluent limits have been developed for the following pollutants found in storm water run-off from treated lumber storage areas: total suspended solids (TSS), oil and grease; and polynuclear aromatic hydrocarbons (PAH). Limits on oil and grease, and TSS represent the degree of effluent pollutant reduction attainable by the application of best conventional pollutant control technology (BCT). Effluent limits for PAH's represent best available technology economically achievable (BAT).

Effluent limits for TSS are based upon the amount of pollutant reduction that could be reasonably be expected through the use of paving, sediment catch basins and selected management practices.

Oil and grease limits reflect effluent quality that can be obtained through the use of a properly operated and maintained oil/water separator.

The limits for total polynuclear aromatic hydrocarbons are based upon sedimentation. The solubilities of the individual PAH's range from a low of 0.5 ppb to a high of 31.7 ppm. PAH solubilities are not an accurate measure of expected storm water PAH

concentrations. PAH's as a class of compounds generally exhibit a strong tendency to adsorb to soil particles, particularly organic soils. Information from the EPA Treatability Data base tends to support this conclusion. EPA found that sedimentation alone is effective at removing at least 92% of most of the PAH's. The median effluent values after sedimentation, reported by EPA for the individual PAH compounds were all substantially below their respective solubilities and were on the order of below detection to 30 µg/L.

Ecologys Class II inspection report also tends to support the conclusion that PAH's tend to bind with soil particles and are amenable to sedimentation. In the report, sediment samples were collected from sedimentation basins and analyzed for PAH's. Total PAH levels in the two basins sampled were 929 mg/kg and 440 mg/kg on a dry weight basis, with individual constituents as high as 211 mg/kg on a dry weight basis. Storm water effluent PAH values for the same area ranged from undetected to a high of 81 µg/L. The Ecology study also sampled storm water influent into the sediment catch basin, a comparison of influent with effluent data found PAH removals across the catch basin to be between 30 and 50 percent in most cases. The catch basins sampled were not well maintained and in need of cleaning, as evidenced by an observed increase in TSS across the basins during the sampling period.

A properly designed and operated sediment catch basin coupled with pollution prevention measures should be effective in controlling the discharge of total PAH's below 100 µg/L. The sediment catch basin must be designed to collect the majority of the particulates in the storm water. (See Appendix 1 for more discussion on the development of technology based effluent limitations.)

Storm water treatment at wood treating facilities is almost nonexistent, and when it does exist, it is primarily limited to sediment catch basins. The sediment catch basins are typically under sized and not properly maintained. Only one facility in Washington has attempted to treat storm water using anything more than sediment catch basins. The facility treats almost half their storm water using mixed media filters containing anthracite coal, activated carbon and sand. No data on the effectiveness of the system is available however, permit application data show PAH values were all below the detection limit of 10 µg/L.

A ground water pump and treatment system at the Wyckoff Eagle Harbor site is using a combination of oil/water separation, dissolved air floatation, biological treatment and carbon filtration to achieve total PAH effluent limits of less than 10 µg/L. The eagle harbor site differs from the typical storm water treatment requirements due to higher initial PAH concentrations and lower constant flow rates. Due to the nature of storm water, flow rates are highly variable and to utilize a eagle harbor type treatment system would require a substantial storm water detention capacity.

It has been determined that discharge limits based upon BCT and BPT satisfy the state technology based treatment requirements for all known available and reasonable methods of pollution prevention, treatment, and control (AKART) under RCW 90.48, 90.52, and 90.54.

II. Water quality, aquatic life based effluent limits

Permit limits for chromium, cadmium, copper, arsenic, lead, and pentachlorophenol are all water quality based. Limits are based upon acute aquatic life water quality criteria applied at the point of discharge. No dilution zone is provided.

The rationale for the choice of acute criteria applied end of pipe are as follows:

A dilution zone for storm water is not considered appropriate for these facilities. Storm water outfalls at wood treating facilities do not have diffusors or other means to ensure consistent mixing. In addition, storm water run-off quantity is highly variable, in many cases discharging to ditches or receiving waters which consist primarily of storm water run-off from other similarly contaminated sources.

State water quality standards under WAC 173-201A-100(10) specifically address allowable dilution zones for storm water. Under this regulation "...the discharger must demonstrate to the departments satisfaction that:
(i) All appropriate best management practices established for storm water pollutant control have been applied to the discharge.
(ii) The proposed mixing zone shall not have a reasonable potential to result in a loss of sensitive or important habitat, substantially interfere with existing characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by the department; and
(iii) The proposed mixing zone shall not create a barrier to the migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem."
The Department does not believe that appropriate BMP's have been applied to storm water run off from wood preserving facilities at this time. Further, no information has been provided to the department to support the determination that the assignment of a mixing zone will not have a reasonable potential to result in a loss of sensitive or important habitat, substantially interfere with existing characteristic uses of the water body.

The determination to use acute criteria rather than chronic criteria is based upon several conservative assumptions built into the permit. The use of total recoverable metals rather than the more bio-available dissolved metals on which the criteria are based, and the requirement that sampling for compliance be done during the first flush of a storm event. Data indicates that pollutant loadings are highest during the first flush, gradually decreasing to some relatively constant level as the storm event progresses. The use of acute criteria coupled with the first flush monitoring and no dilution zone should result in no acute or chronic toxicity in the receiving waters. Acute and chronic biomonitoring will be required to verify these determinations.

The freshwater acute criterion for pentachlorophenol is pH dependant, increasing with increasing pH. A pH of 7.0 was used to calculate the freshwater pentachlorophenol effluent limit of 9 µg/L. A pH of 7 was chosen to calculate the pentachlorophenol limit

based upon information which indicates storm water from pentachlorophenol treated lumber storage areas generally varies from a pH of 6 to about 7.5. The storm water pH tends to decrease slightly as the storm event progresses. Sampling for compliance with pentachlorophenol effluent limits is required during the first flush when pentachlorophenol concentrations and the storm water pH are expected to be highest. Given the first flush sampling requirements, the relatively weak dependance of pentachlorophenol toxicity on pH, and the tendency for pentachlorophenol concentrations to decrease as the storm event progresses, the use of an average storm water pH of 7 was chosen.

For freshwater discharges, cadmium, copper, and lead toxicity are all hardness dependant. A hardness of 100 mg/L was used to calculate freshwater water quality criteria. Little information was found concerning the hardness of storm water runoff from wood treating facilities. Application information from one wood treating facility indicates a range of expected hardness from less than 50 mg/L to more than 300 mg/L. Hardness can be expected to vary significantly between facilities and even within a facility, in addition to varying throughout a storm event. Many discretionary operating practices can have an impact on the hardness of storm water run-off, primarily the use of dust suppressants, the use of which can result in elevated storm water hardness values. Because of the possibility of discretionary operating practices resulting in artificially high storm water hardness values, the use of actual storm water hardness was discarded. A review of typical freshwater water hardness values from Ecology's ambient water quality monitoring program indicates a range of receiving water hardness values from less than 30 mg/L to more than 170 mg/L. Lower hardness values are typically found on more pristine, less impacted waterbodies. Woodtreating facilities in Washington are generally located in developed areas where receiving water hardness can be expected to be higher.

A hardness of 100 mg/L was chosen to calculate all hardness dependant criteria. The use of this value is a compromise between the use of expected actual storm water hardness, which is expected to be higher, and receiving water hardness, which is expected to be near 100 mg/L or slightly lower.

The aquatic life criteria for chromium is dependant upon its oxidation state. By far the largest source of chromium found in storm water from treated lumber storage areas is leached or washed off from treated lumber. Chromated copper arsenate treating solutions consist of chromium in the more toxic hexavalent state.

A recent Environment Canada Report indicates that, based upon a limited study, 97% of arsenic in soil and water samples taken in the vicinity of CCA facilities remained in the original pentavalent states. Reduction of hexavalent chromium and pentavalent arsenic is possible in some limited receiving environments; however, it is not anticipated that a significant amount of chromium or arsenic will change oxidation states in the receiving environment.

The use of total recoverable metals analysis procedures required in NPDES permits, provides a measure of the total metals in an effluent. This analysis procedure measures

both the dissolved and the potentially less bioavailable particulate fractions. Because the water quality criteria are based upon the more bioavailable dissolved fraction the use of total recoverable metals may result in water quality based effluent limits which are conservative. Without any evidence as to how the metals are partitioned between the particulate and dissolved fractions and given the possibility for the particulate fraction to redissolve, the use of acute criteria based upon total recoverable metals analysis was chosen. The more toxic hexavalent chromium freshwater criteria are used due to its predominance over trivalent chromium in the treating solutions.

III. Human health criteria

On December 22, 1992 the Environmental Protection Agency published in the Federal Register human health-based water quality criteria for 91 toxic compounds. The criteria apply to all Washington state waters with one or more of the following characteristic uses: Fish and shellfish, Fish, Water Supply (Domestic), and Recreation. Human health criteria for toxics which are expected to be present is storm water runoff from wood preserving facilities are presented in Table 3.

Based upon EPA's rule making, the criteria are effective February 5, 1993. The Toxics rule also includes implementation instructions, including default values for critical receiving water flows and mixing zones.

With the exception of arsenic, all of the toxics in Table 3 are expected to be found in storm water run off from facilities using creosote and/or pentachlorophenol. Arsenic is the only toxic compound expected to be present in storm water run off from inorganic pressure treating facilities.

The Department believes that storm water discharges from wood preserving facilities are possibly causing exceedances of human health criteria in receiving waters. Existing data (see Selected Storm Water Effluent Data summary) indicates that arsenic levels in storm water run-off are between 70 and 13,000 times the criteria for consumption of organisms only. The only quantitative storm water data on any of the other human health toxics in table 3 are contained in Ecology's 1986-87 Class II inspection report of Pacific Wood Treating Corporation. Current NPDES applications from facilities using pentachlorophenol and/or creosote are inconclusive given the relatively high detection levels reported.

The department has substantial data from a number of facilities which indicate that storm water arsenic levels would exceed the human health criterion if applied at the "end-of-pipe". Given the location and limited dilution available at most of the facilities in Washington, the likelihood of compliance with the arsenic criterion, even after taking into account available dilution, is small. Dilution factors would have to exceed, at a minimum 70, and on average more than 2700, based on the lowest arsenic level reported and an average of all arsenic levels reported, respectively.

TABLE 3.

Compound	Human Health Criteria, For consumption of:	
	Water & Organisms (µg/L)	Organisms only (µg/L)
Arsenic	0.018	0.14
2,3,7,8 TCDD	0.000000013	0.000000014
2,4-Dichlorophenol	93	790
2,4,6-Trichlorophenol	2.1	6.5
Pentachlorophenol	0.28	8.2
Anthracene	9600	110,000
Benzo(a)Anthracene	0.0028	0.031
Benzo(a)Pyrene	0.0028	0.031
Benzo(b)Fluoranthene	0.0028	0.031
Benzo(k)Fluoranthene	0.0028	0.031
Chrysene	0.0028	0.031
Fluoranthene	300	370
Fluorene	1300	14000
Pyrene	960	11000
Dibenzo(a,h)Anthracene	0.0028	0.031
Indeno(1,2,3-cd)Pyrene	0.0028	0.031

Under the state water quality standards (WAC 173-201A-100 (10)(b)) the allowable mixing zones for storm water may be granted an exception to the numeric size criteria contained in subsections (7), (8) and (9) in WAC 173-201A-100. This allowance is conditioned upon several determinations:

"(i) All appropriate best management practices established for storm water pollutant control have been applied to the discharge.
(ii) The proposed mixing zone shall not have a reasonable potential to result in a loss of sensitive or important habitat, substantially interfere with existing characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by the department; and
(iii) The proposed mixing zone shall not create a barrier to the migration or translocation

of indigenous organisms to a degree that has the potential to cause damage to the ecosystem."

The Department has decided to defer the application of human health based effluent limitations to wood preservers. Although limits based on human health are being deferred, the Department believes that an overall improvement in water quality will occur as a result of controls required by the technology and aquatic life based effluent limitations. As those improvements are being implemented, the Department will be adopting both criteria and implementation rules for the protection of human health. Limits based on that rule will then be placed in permits consistently throughout the state. Deferment of human health based effluent limitations is based on the following rational.

With the exception of arsenic, the Department is unable to make a "reasonable potential" determination that discharges from wood preserving facilities will cause water quality standards for the human health toxics to be exceeded. There is no current data, and little historical data on concentrations of chemicals that have human health based standards in storm water discharges from pressure wood preserving facilities in Washington. Because of this lack of data, the permits contain conditions requiring monitoring and characterizing storm water discharges for the toxic compounds for which human health-based criteria have been adopted.

While the department believes that a reasonable potential exists for storm water discharges from inorganic pressure treating facilities to cause violations of applicable human health based criteria for arsenic, sufficient site specific information is not available to assign an appropriate mixing zone. Best management practices are not in place and their affect on storm water quality has not been evaluated. Current storm water discharges from wood preserving facilities have little or no technology based controls and a minimal application of best management practices. The Department believes that after the application of controls to address technology and aquatic life-based effluent limits, the discharge of many of the compounds of concern will be greatly reduced if not largely eliminated.

Although the EPA has adopted default implementation language, much of the information necessary to develop human health based storm water limitations under WAC 173-201A-100 (10)(b) is not available for this states wood preserving industry. Needed data include; point of compliance or allowable dilution zone, storm water effluent flow rates, critical receiving water flow values, background receiving water concentrations for the compounds of interest, and processes for factoring in the episodic nature of storm water discharges.

The episodic nature of storm water run off and the long periods of no discharge during dry summer months requires the use of some form of averaging to account for the long exposure durations upon which the human health criteria are based. The application of the criteria directly to a storm water discharge without factoring in the periods of no discharge is not sensible, given the 70 year exposure duration that the criteria are based on. EPA's toxics rule does not address periodic discharges such as storm water.

Many of the implementation details, such as; applicable dilution/mixing zones, critical flow conditions, and averaging periods for storm water will be resolved with the upcoming adoption of human health criteria for the state.

As part of the determination of whether to apply, at this time, the arsenic criterion, the Department has noted the wide disparity between the allowable drinking water maximum contaminate levels (MCL's) and the recently promulgated criterion. The drinking water MCL for arsenic is 50 µg/L, this value is more than 2700 times the allowable receiving water concentration of 0.018 µg/L, for the consumption of water and organisms under the EPA promulgated toxics rule.

Permit conditions are included in the permit which will allow the Department to evaluate, and if necessary to impose limitations necessary to protect human health when this permit is renewed. During the 5-year permit cycle the permittees will be implementing controls required to comply with technology and aquatic life based effluent limitations. These controls will result in large decreases in concentrations of human health toxics in storm water from this industry with consequent improvements in water quality. In the fifth year of this permit, as part of the permit renewal process, permittees will be required to submit information on storm water effluent from their facility and receiving water, as well as site specific flow and dilution characteristics. These data will be used in conjunction with the new state human health rule to develop limits, if required, for this industry that are consistent with other permits issued in this state.

IV Effluent limitations

Based upon the previous rationale, the effluent limits for treated lumber storage area storm water have been developed and are summarized in Table 4.

The Department notes that effluent limitations for arsenic and many of the individual PAH constituents for which human health criteria have been promulgated will likely change in the next round of permits for this industry. Dischargers covered by this permit are encouraged to keep in mind the likely future human health based requirements when evaluating control options necessary to come into compliance with current permit effluent limitations.

The Department recognizes that storm water discharges from the industry, as it exists currently, will exceed the above effluent limitations. A three year compliance schedule is included in the permit to provide time for the industry to evaluate, design, install and implement the necessary best management practices and storm water controls.

Pursuant to WAC 173-201A-160 (4)(b) interim effluent limitations have been established. The interim limitations have been established for pentachlorophenol, copper and chromium. Interim limitations have not been established for lead or cadmium because these pollutants should not be present except possibly as a contaminate of the treating solutions used.

TABLE 4.

PARAMETER	BASIS	LIMIT	
		FRESHWATER DISCHARGE	MARINE WATER DISCHARGE
pH	WQ	6.5-8.5	7.0-8.5
Oil & Grease	BCT/AKART	10 mg/L	10 mg/L
TSS	BCT/AKART	50 mg/L	50 mg/L
Pentachlorophenol	WQ	9 µg/L	13 µg/L
PAH	BAT/AKART	100 µg/L	100 µg/L
Arsenic	WQ	360 µg/L	69 µg/L
Cadmium	WQ	4 µg/L	43 µg/L
Chromium	WQ	16 µg/L	1100 µg/L
Copper	WQ	18 µg/L	2.9 µg/L
Lead	WQ	56 µg/L	151 µg/L

Interim limitations were set at the means of reported storm water effluent concentrations for pentachlorophenol, copper and chromium. The mean effluent value for arsenic was not significantly different from the effluent limit based on acute aquatic life based water quality criteria. Because of the insignificant difference, 360 µg/L vs. 381 µg/L the aquatic life based limit is retained througout the term of the permit.

TABLE 5.

	Pentachlorophenol	Copper	Chromium	Arsenic
Number of Samples	15	65	65	19
Mean (µg/L)	214	539	1032	381
Maximum (µg/L)	970	8200	14000	1860
Minimum (µg/L)	21	8	24	10
Standard Deviation	278	1143	2049	425

soils contamination from past or present poor operating practices.

A well designed facility instituting effective operating practices should be able to eliminate the contamination of white wood storage area storm water with pollutants found in the treating solutions. For this reason the effluent limits for all the constituents of concern are identical to the limits for treated product storage area storm water. The monitoring frequency for untreated product storage area storm water will be less than is required for treated product storm water.

E. GROUNDWATER

On December 1, 1990, Ecology adopted Chapter 173-200 WAC, Water Quality Standards for Groundwaters of the State of Washington. These standards require that any permit issued by the Department be conditioned in such a manner as to authorize only activities that will not cause violations of this Chapter.

There are two general areas at a typical wood treating facility which have a reasonable potential to impact groundwater quality. The process area, including tank farm, retort, and drip pad area, and the treated product storage areas are both areas where past or present activities have resulted in or have the reasonable potential to impact groundwater quality (see 53 FR 53282-53337). Several woodtreating facilities in Washington have confirmed groundwater contamination problems. Based upon the widespread evidence of ground water problems associated with wood treating facilities, both within Washington and nationwide, Ecology has determined that monitoring of groundwater to determine compliance with State groundwater standards may be appropriate. Because soils, ground water characteristics and the potential to pollute ground water are highly site specific, it is not possible to specify uniform ground water requirements for this industry.

The need for ground water monitoring will be based upon the Departments determination of the specific facilities potential to discharge to ground water. This determination will be a two tiered evaluation. The first step will be a preliminary determination of the potential to discharge to ground. Facilities with inadequate spill containment, in-use under ground storage tanks and/or process piping, unpaved or uncovered treated wood storage areas, or otherwise have the potential to ground will be required to submit a hydrogeologic site assessment to Ecology. The site assessment will identify the soils and other hydrogeologic characteristics of the site and will be used by Ecology, along with site specific storm water effluent data to determine the potential for current operations to violate state ground water standards.

5. MONITORING REQUIREMENTS

A. SAMPLE COLLECTION

Because of the way the effluent limits were developed, the samples collected to determine compliance with the storm water effluent limits must be first flush samples.

V. Whole Effluent toxicity testing requirements

In addition to the numerical effluent limits, both acute and chronic toxicity testing will be required on storm water run-off from treated wood storage areas for the purposes of characterization. The following effluent characterization tests will be required in the first two years of the permit:

- Acute Toxicity:

  Treated product storage area storm water shall be tested once every month for the months of September through May until 12 samples have been tested.

  Untreated product storage area storm water shall be tested once every other month for the months of September through May until 6 samples have been tested.

  All acute toxicity tests shall be conducted using two organisms: 1) Rainbow trout, *Oncorhynchus mykiss*; or Fathead minnow, *Pimephales promelas*; and 2) Water flea, *Daphnia pulex* or *Daphnia magna*.

- Chronic biomonitoring:

  Both treated and untreated product storage area storm water shall be tested once every other month for the months of September through May until 6 samples have been tested.

  All chronic biomonitoring tests shall be conducted using two organisms: 1) Fathead minnow, *Pimephales promelas*, and 2) Water flea, *Ceriodaphnia dubia*.

  Based upon the results of the toxicity testing, Ecology may issue a order or modify the permit to incorporate toxicity limits. In the absence of an order or permit modification the permittee is required to continue toxicity testing at the rate of once every three months for acute toxicity and twice a year for chronic. Testing is only required during the wet season which is defined in this permit as being the months of September through May.

D. UNTREATED WOOD STORAGE AREA STORM WATER

The third major source of storm water from woodtreating facilities is from white-wood or untreated wood storage areas. For the purposes of this permit, storm water from white-wood storage areas includes all facility storm water not associated with treated product storage areas or the process areas.

The pollutants of concern in white wood storage area storm water are the same as those in treated product storage area storm water, namely: total suspended solids; total oil and grease; chromium; copper; arsenic; lead; pentachlorophenol; and polynuclear aromatic hydrocarbons. The pollutants of concern are identical due to the practice of storing treated product in the untreated wood storage areas, the use of the same material handling equipment for treated and untreated lumber, and some cases possible

The use of a composite or other means of collecting a representative sample over the entire storm event would not be protective of chronic impacts and may not be protective of acute impacts since the permit limits are based upon acute criteria applied end-of-pipe.

The permittee is allowed to combine the grab samples from all untreated wood storage area storm water outfalls for a single analysis. The combined sample shall be a flow proportioned composite of the individual grab samples. Each storm water outfall from the treated wood storage area must be separately analyzed.

The first flush is defined in this permit as the first 60 minutes of discharge. All storm water sampling is required to be from a storm event that is greater than 0.1 inches in magnitude and that occurs at least 48 hours from the last measurable (0.1 inches) rain fall event. The use of 60 minutes as a definition of first flush is a recognition that in many cases it may be impossible to consistently collect samples any earlier in the storm event. A one hour time window to sample will allow the permittee to sample based upon reaction rather than prediction. The use of a 0.1 inch magnitude storm event is based upon the EPA storm water general NPDES permit. The permittee is required to collect a sample from the first measurable storm event of the season. The storm season is defined as September through May.

B. FREQUENCY

The sampling frequency differs depending upon the storm water source, storm water from the treated lumber storage area is monitored more frequently than storm water from the untreated lumber storage area. The frequency of sampling during the storm season is; once per month for treated wood storage area storm water and once every two months for untreated wood storage area storm water.

6. OTHER PERMIT TERMS AND CONDITIONS

Many of the activities at a wood preserving facility have had, or can have, an effect upon storm water run-off quality. Ecology believes that prevention of storm water contamination is preferred over end-of-pipe treatment technologies. Prevention alone, however, may not result in compliance with all storm water effluent limitations. Because discretionary operating practices can have such an impact upon storm water effluent quality, Ecology has determined that the imposition of best management practices in the permit and the development by the permittee of site specific pollution prevention and spill prevention plans are necessary.

A. BEST MANAGEMENT PRACTICES

The best management practices (BMP's) contained in this permit have been determined, based upon the consideration of the criteria contained in 40 CFR 125.103, to be necessary to prevent and control the discharge of pollutants to waters of the State. The BMP's contained in the permit address the following areas of operation:

A. Transfer and storage of treating solutions and the materials which make up the treating solutions.

B. Secondary containment requirements for the tank farm and retort areas.
C. The disposal requirements for drip pad storm water or any drip pad wash water that may be generated as a result of compliance with 40 CFR 264.572(i) and 40 CFR 265.443(i).
D. Drip pad operating practices.
E. Material handling practices
F. Sediment catch basin maintenance.
G. Solid waste handling and disposal
H. Oil water separators

B. POLLUTION PREVENTION PLAN

A site specific facility Pollution prevention plan is required to be developed by the permittee and submitted to Ecology. The plan is necessary to ensure that the facility will consistently be operated in compliance with all terms and conditions of the discharge permit. At a minimum, the pollution prevention plan must address the following areas:

A. For each area of the facility that generates storm water a description of the storm water collection system including collection area, sources such as roof and floor drains, any storm water management devices including catch basins and oil/water separators and possible pollutant sources within the area.

B. A description of all potential pollutant sources or activities which could be expected to impact storm water quality. At a minimum the following activities and sources shall be addressed:

1. Raw material storage and handling practices including, but not limited to treatment chemicals and untreated wood;

2. Any manufacturing operations before or after the treatment process such as peeling, drilling and incising;

3. The wood treating process area including trams, tram storage, transfer table and drip pad;

4. Treated product handling and storage;

5. Material handling equipment maintenance and repair areas and activities.

C. A description of the actions and operating practices, including management controls that will be taken to reduce and/or eliminate the contamination of storm water from the sources or activities identified in B above.

D. A description of the Process used to determine if, and the actions taken to ensure that process waste waters are not being discharged to waters of the state.

E. A description of preventive maintenance requirements necessary to ensure the proper operation of the storm water collection and treatment system.

F. A description of the management and/or operational practices which will be employed to ensure that treated product is not removed from the drip pad until it has ceased dripping as required under 40 CFR 264.572 (k) and 40 CFR 265.443 (K).

G. A description of the operational and/or management controls used to prevent the drippage or kickback of treatment chemicals in the treated product storage yard and the procedures used to identify and remove any drippage which does occur in the storage yard.

H. A description of the employee training process used to ensure that all appropriate employees are familiar with the intent and content of the plan.

I. The plan shall be signed by a qualified licensed professional engineer. The plan shall also be signed by a ranking responsible official of the permitted organization.

C. SPILL PREVENTION AND CONTROL PLAN

The permittee is required to submit a spill prevention and control Plan to Ecology for review and approval within six months of the effective date of the permit. The plan must be signed by a registered professional engineer qualified to determine the effectiveness and adequacy of the permittee's secondary containment, per WAC 173-303-640.

D. SOLID WASTE DISPOSAL

The permit requires the submittal of a solid waste control plan to the Department within 180 days after the issuance of the permit. Some of the solid wastes generated at pressure wood preserving facilities include: sludges composed of dirt, saw dust and other debris mixed with the treating solutions which are removed from the retort and generated as a result of filtering the treating solutions; hog fuel boiler ash and solid debris; wood chips and other wood debris, both treated and untreated; and packaging such as containers and wrappings associated with the treating chemicals. The Department believes that many of the solid wastes generated at wood preserving facilities, if not handled properly, have a potential to contaminate storm water. Because of this potential the submittal of a solid waste control plan is required.

7. SPECIAL STUDIES

Because of the limited availability of site specific information, the Department has determined that additional site specific studies may be necessary to ensure compliance with State Water Quality Standards (Chapter 173.201A WAC), Groundwater Quality Standards (Chapter 173.200

WAC), and Sediment Quality Standards (Chapter 173.204 WAC).

A. GROUNDWATER SAMPLING PLAN

For facilities which the Department has made the preliminary determination that current operating practices have the potential to discharge to ground, a hydrogeologic site assessment shall be required. The assessment shall be submitted to Ecology for review and approval within 18 months of the effective date of the permit.

The assessment shall, at a minimum: 1) identify the soils on site by soil permeability and according to the 32 management groups as identified by Washington Irrigation Guide Part WA681, October 1985; 2) contain a site map showing soils, vegetation, natural and created drainage systems, topography, depth to ground water, adjacent land uses, and nearby water supply wells; 3) describe the surface geology and the geologic material underlying the site including areas of fill and the depth of fill; 4) contain any existing information on soils and/or ground water contamination and any past studies done to determine such contamination; 5) bibliography for all data included in the report; and 5) summary of the preparers qualifications.

The site assessment shall be prepared by a qualified geologist, hydrogeologist, soil scientist, agronomist or licensed professional engineer. A summary of the preparers qualifications and experience shall be included as part of the assessment. Existing geologic and hydrogeologic site information may be used to fulfill all or part of the requirements of this section.

B. SEDIMENT MONITORING

The characteristics that make a good wood preservative are the same characteristics that make the chemicals used in wood treating an environmental threat. Two of the characteristics of a good wood preservative are toxicity and persistence. Based both upon the toxicity and the persistence of the chemical constituents of wood preserving solutions sediment monitoring is required in this permit. The permittee is required to submit a study plan for review and approval within 12 months of the effective date of their permit. Chemical analysis, acute and chronic toxicity testing are required.

Chemical analysis of the sediments is required from three areas; upstream, at the base of the outfall and down stream. The constituents that must be analyzed for are dependant upon the treating chemicals being used or which have been used at the facility. For a facility using pentachlorophenol, creosote and inorganic based treating solutions the following constituents must be analyzed for;

Chlorophenols;
- 2,4,6-Trichlorophenol
- 2,3,4,6-Tetrachlorophenol
- Pentachlorophenol

Polynuclear Aeromatic Hydrocarbons;

Naphthalene	Acenaphthylene
Acenaphthene	Flourene
Phenanthrene	Anthracene
Fluoranthene	Pyrene
Benzo(a)anthracene	Chrysene
Benzo(b)fluoranthene	Benzo(k)fluoranthene
Benzo(a)pyrene	Dibenzo(a,h)anthracene
Benzo(ghi)perylene	Indeno(1,2,3-cd)pyrene

Dioxins and Furans;

- 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin
- Tetrachlorodibenzo-*p*-dioxins
- Pentachlorodibenzo-*p*-dioxins
- Hexachlorodibenzo-*p*-dioxins
- Heptachlorodibenzo-*p*-dioxins
- Octachlorodibenzo-*p*-dioxins
- Tetrachlorodibenzofurans
- Pentachlorodibenzofurans
- Hexachlorodibenzofurans
- Heptachlorodibenzofurans
- Octachlorodibenzofurans

Inorganics;

Arsenic	Cadmium
Chromium	Copper
Lead	Zinc

Based upon the results of the chemical analyses and the toxicity tests the permittee may be required to do a biota survey.

C. DIOXIN AND FURAN STUDY

The U.S. EPA has found that pentachlorophenol formulations used in the wood preserving industry are contaminated with all polychlorinated dibenzo-p-dioxins (PCDD) and dibenzofurans (PCDF) homologues except 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) (53 FR 53287). TCDD has been detected in surface protection wastes (53 FR 53303). No explanation was provided as to why TCDD was detected in the non-pressure surface protection processes and not detected in the pressure treating segment of the industry.

In support of EPA's recent hazardous waste listings, EPA found that the calculated equivalent 2,3,7,8 TCDD concentrations for all congener groups averaged 300 PPB for in-use pressure treating solutions and 700 PPB for in-use surface protection solutions (53 FR 53301, 53303). Using an average pentachlorophenol pressure treating solution concentration of 2.6%, a ratio of equivalent TCDD to pentachlorophenol can be calculated to be 1.2×10^{-5} grams equivalent TCDD per gram of pentachlorophenol.

No information is available on PCDD or PCPF concentrations in treated wood storage yard storm water effluent; however, assuming the ratio of equivalent TCDD to

pentachlorophenol remains the same, an estimate of equivalent TCDD storm water concentrations can be calculated from storm water pentachlorophenol values. Documented pentachlorophenol levels in treated wood storage yard storm water have been as high as 970 PPB (Pacific woodtreating Class II inspection April 1989). Assuming a constant equivalent TCDD to pentachlorophenol ratio of 1.2×10^{-5}, results in an estimated equivalent TCDD storm water concentration of 12 parts-per-trillion or 12 ng/L. The assumptions on which this estimate is based are likely conservative ones.

It is unlikely that the ratio of equivalent TCDD to pentachlorophenol will remain constant from treating solution to storm water discharge. Information on solubility and sorption characteristics for TCDD and pentachlorophenol indicates that pentachlorophenol is substantially more mobil than TCDD and, presumably, the other PCDD and PCDF homologues. Because of the lower solubility and higher sorption characteristics of PCDD and PCDF, storm water equivalent TCDD concentrations would be expected to be less than would be calculated, assuming a constant ratio.

A further complication is the use of equivalent TCDD. Even though the 2,3,7,8 tetrachlorodibenzo-p-dioxin isomer has not been detected in pressure treating solutions, an equivalent TCDD concentration has been calculated. This value is based upon a toxicity weighted summation of all the 2,3,7,8 TCDD congener concentrations detected in-use treating solutions. Recent regulatory actions with respect to Dioxin in Washington, including the Columbia River TMDL prepared by EPA, have all focused upon 2,3,7,8 TCDD and did not use equivalent TCDD concentrations.

It is not appropriate to apply 2,3,7,8 TCDD limits on an equivalent TCDD concentration basis. This was not done by EPA in the development of the Columbia River TMDL for the following reasons:

1. Little is known about the tendency for other dioxins and furans to be taken up and bioconcentrated. In addition, little is known whether dioxins or furans are metabolized by fish or other organisms, which would affect their persistence. The determination of equivalent concentrations is based upon an estimate of the relative toxicity of each specific isomer with respect to 2,3,7,8 TCDD. This estimate is based mostly upon structural similarity and not upon actual laboratory data.

2. Washington has historically regulated carcinogenic substances on a chemical-by-chemical basis and not based upon a cumulative risk for all (or a group of) chemicals.

3. EPA expected, and evidence supported that action taken to reduce 2,3,7,8-TCDD would also reduce other dioxins and furans.

In summary, dioxins and furans have been detected in pentachlorophenol wood treating solutions; however, the 2,3,7,8-TCDD isomer has not been detected in pressure treating solutions. No information was found regarding dioxin and furan concentrations in storm water from treated wood storage areas. A worst case estimate based upon the

assumption that dioxins and furans found in treating solutions behave similarly to pentachlorophenol with respect to environmental transport and fate indicates a possible significant human health concern.

Because of the lack of information on dioxin and furan levels in treated wood storage areas, storm water effluent limits have not been developed. There is a potential for dioxins and furans to be discharged in treated wood storage area storm water. A dioxin/furan study will be required to determine the presence, and at what levels dioxins and furans are present in treated wood storage area storm water. In the event that the study indicates that dioxins and furans are being discharged at levels which pose a threat to human health or the environment, the permit will be reopened and effluent limits imposed.

The Dioxin and furan study will only be required from facilities which are currently using pentachlorophenol based treating solutions or have in the past used them. For facilities which have used pentachlorophenol in the past the decision to require the dioxin and furan study will be based upon the potential for on-going storm water contamination due to residual soils contamination or other means. The use of pentachlorophenol as an indicator of the possible presence of dioxins and furans is recommended.

The Dioxin and Furan study consists of chemical analysis of both storm water runoff and in-use treating solutions. The analysis of in-use treating solutions is necessary to determine the levels at which dioxin and furans are present in a worst case situation. In-use treating solutions are should be sampled rather than virgin treating solutions because of the possibility for composition changes due to the elevated temperatures and pressures found in the treating process. Sampling the treating solutions will provide a conservative estimate of the dioxin and furan loadings to the site. Treated wood storage area storm water sampling will directly measure the off site transport of dioxins and furans. Because of the extremely low levels at which these compounds are of a concern, it may not be possible to evaluate the risk to human health and the environment from storm water samples alone due to the analytical limits of detection. In the absence of conclusive storm water sample data it may be necessary to use modeling based on treating solution concentrations to predict storm water effluent concentrations of dioxins and furans.

D. DILUTION AND RECEIVING WATER CHARACTERIZATION

As discussed under the section on Human Health (4.C.III) the Department does not have sufficient information, at this time, to develop effluent limitations to protect human health. The permit requires the submission of a site specific report evaluating storm water discharge flow rates, critical receiving water flows and the relevant receiving water concentrations of the human health toxics contained in Table 3.

8. HAZARDOUS WASTE LISTINGS AND STORM WATER REQUIREMENTS

The hazardous waste listings adopted by EPA on December 6, 1990, list as hazardous the kick-back or preservative drippage from treated wood. Also included in the listings are design

requirements for retort drip pads. A key requirement of the listings is the requirement that treated product remain on the drip pad until drippage has "ceased" (40 CFR 264.572, 40 CFR 265.443). EPA has recognized that there will be some minimal drippage after the wood is removed to the storage yard. Minimal drippage has been clarified to mean de minimis losses, or less than one pound of the listed wastes dripping in the storage area. This incidental drippage would not constitute illegal disposal of a hazardous waste provided that there is an immediate response to the discharge of drippage (Sylvia K. Lowrance, EPA, May 31, 1991). Failure of an operator to respond to drippage in the treated wood storage area could constitute a hazardous waste violation. This permit requires as part of the operating plan the facility operator to develop procedures to identify any drippage in the treated lumber storage area and to remove and dispose of any contaminated media in a timely manner.

The intent of this permit is to compliment the requirements for wood preserving facilities under the Hazardous Waste Regulation. There are record keeping and reporting requirements under the new Hazardous Waste Listing for such things as drip pad design, maintenance and operation. Many of these requirements are incorporated into the permit as Best Management Practices. Inclusion of these conditions in the permit are not intended to take the place of or replace any specific requirements applicable to these facilities under the Hazardous Waste Regulations, but are intended to address the potential for surface and/or groundwater contamination as a result of the on-going operation of these facilities.

On September 9, 1992, the EPA issued the nation-wide storm water baseline general permit. This general permit covers storm water discharges from pressure wood preserving facilities. The final permit does not contain effluent limitations for the wood preserving industry. It does however, include monitoring requirements for; oil and grease, COD, pH, and TSS. Pentachlorophenol facilities must also monitor for pentachlorophenol and acute whole effluent toxicity. Facilities using creosote must measure whole effluent toxicity. Facilities using chromium-arsenic formulations must sample for arsenic, chromium and copper. On November 18, 1992 the department of Ecology adopted the Baseline General Permit for Storm Water. This storm water general permit unlike the EPA national storm water general permit does not address wood preserving facilities.

Based upon storm water run-off data collected on this industry in Washington, Ecology believes that a reasonable potential exists that surface water quality standards are being exceeded. Based upon 40 CFR part 122.44(d) and WAC 173-220-130(b) effluent limitations must be included in the permit as necessary to insure compliance with State water quality standards, chapter 173-201A WAC.

APPENDIX 1

DEVELOPMENT OF TECHNOLOGY BASED EFFLUENT LIMITS

The factors that must be considered when developing effluent limits based upon best professional judgement are contained in 40 CFR Part 125.3. The factors for best available technology economically achievable (BAT) are contained in 40 CFR 125.3 (d)(3). They are:

(i) The age of the equipment and facilities involved;
(ii) The process employed;
(iii) The engineering aspects of the application of various types of control techniques;
(iv) Process changes;
(v) The cost of achieving such effluent reduction; and
(vi) Non-water quality environmental impact (including energy impacts).

An evaluation of the above factors will be made to determine the level of treatment which constitutes Best available Treatment Economically achievable for storm water runoff from wood treating facilities. The above factors will also be used as a basis for determining what constitutes All Known, Available and Reasonable Methods of Prevention, Control and Treatment as required under Chapters 90.48, 90.52 and 90.54 RCW.

For the purposes of this evaluation it is assumed that treated and untreated wood is segregated and management practices are in place which will eliminate the treatment chemical contamination of storm water runoff from untreated wood storage areas.

The age of the wood pressure treating facilities in Washington range from less than 5 years to more than 50. The age of a facility should have little effect upon the evaluation of treatment technologies. This is because with limited exceptions none of the facilities are currently treating storm water runoff. In general, it is assumed that storm water runoff treatment is either not currently being employed or if employed is not adequately designed and operated. Some facilities have installed sediment catch basins and one facility has installed a multi-media filtration system with coal, sand and carbon to treat a portion of their runoff, however there is little or no information on the effectiveness of these systems.

The existing equipment or facilities that are used for storm water treatment and control are highly variable across the industry. Storm water control measures range from grading alone to entirely paved and largely covered treated wood storage areas. Existing treatment technologies currently in use consist primarily of small sediment catch basins designed for the removal of sand and gravel sized particles. They are largely ineffective in removing the smaller particles upon which most of the pollutants are thought to be adsorbed.

The treatment and control technologies considered for the removal of process pollutants from storm water runoff include both pollution prevention options and collection and treatment options. The

pollution prevention options considered were roofs or covers to prevent rain contact with treated wood. Process changes as a means of pollution prevention, such as alternative wood treatments to reduce toxicity and/or improve the resistance to leaching are not being considered. To a large extent the industry is market driven and is not in the position to unilaterally change treatment processes. This is particularly true for facilities which treat with pentachlorophenol and creosote.

Roofed areas for treated wood storage are being used by several facilities for at least part of their treated product inventory. In at least one case roofs are necessary to maintain product appearance for overseas customers. The use of roofed storage is more common for inorganic based treaters which treat dimensioned lumber. No roofed storage for poles was observed. The lack of covered pole storage is due to the size of the poles.

There are other methods which may be used to prevent rain contact with treated wood besides roofs, for example the use of plastic, tarps or portable roofs may be effective. The use of plastic or similar materials to cover lumber units or in some cases individual pieces of lumber is wide-spread in other areas of the timber products industry. For example, plywood and glue laminated timbers are routinely wrapped to prevent moisture damage. The use of plastic or similar covers may interfere with product quality by trapping moisture inside and promoting the growth of molds. Mold and other undesirable problems associated with plastic covers may be reduced or eliminated by allowing the wood to dry under roofed areas for a period of time before it is moved outside for longer term storage. The use of portable covers or roofs is also an option that is available which will reduce the amount of treating chemicals leached from the treated wood. Again no wood treating facilities are using this prevention option, however portable roofs or covers are used to prevent checking and cracking due to direct sun light in other segments of the wood products industry.

Another prevention option is reducing the amount of preservative drag-out from the retorts which is carried out to the storage yards. By changing the way that the lumber is racked or bundled within the retort and on the drip pad the amount of carry over can be reduced. This is demonstrated in the metal finishing industry by the impact that material racking has on the amount of drag-out which occurs from the process tanks. The use of material racking as a prevention method is not being considered here because of the specific considerations for different products and site conditions.

Treatment of storm water runoff implies some sort of collection system. Existing collection systems range yards that are from completely unpaved and minimally graded to reduce the number and depth of puddles to yards that are completely paved with the storm water runoff directed to a collection system. Most of the treating facilities in Washington have at least some portion of their treated wood storage areas paved. In all cases the paving material is asphalt.

The treatment options considered for the removal of pentachlorophenol, the sixteen polynuclear aromatic hydrocarbons, arsenic, cadmium, chromium, copper, lead, oil and grease and, total suspended solids from storm water runoff were; Sedimentation, Filtration and, Carbon Adsorption.

Based upon EPA's treatability manual the treatment effectiveness for the three unit operations is similar. The median removal efficiencies and median effluent concentrations for the three unit operations are provided in tables A1, A2 and A3. None of the candidate technologies are uniformly more effective at removing all the pollutants of concern. Because of the essentially identical results, sedimentation was chosen as the model treatment technology due to its lower capital and operating

costs.

The use of sedimentation as a treatment technology requires that the pollutants in the storm water not be present in the dissolved form. There is evidence that the storm water contaminates at wood preserving sites are readily adsorbed to soils and organic matter. The solubilities and log octanol/water partition coefficients for chlorophenols and polynuclear aromatic hydrocarbons are included in table A4. The log octanol/water partition coefficient measures the affinity of a compound for octanol and water phases. It is a useful parameter for predicting the potential for sorption when experimental data is not available. Increasing log octanol/water values indicate stronger adsorption tendencies.

Paving treated wood storage yards will reduce the contact of the treating chemicals with soils and other adsorptive materials. This may result in a decrease in adsorption and a possible reduction in the effectiveness of sedimentation as a removal option. Given the historical contamination that is found in many of the treated wood storage yards it is anticipated that paving will be desired to minimize the storm water contamination due to past operating practices. This benefit is expected to out-weigh any disadvantage due to decreased adsorptive capability. There is a possibility that the asphalt paving materials will act as an adsorbent, particularly for the organics. Paving will also reduce the possibility for ground water contamination due to storm water infiltration.

Ecology's Pacific Wood Treating Class II inspection report generally supports the conclusion that much of the toxic pollutants in storm water runoff are associated with particulates. The sediment from the sediment catch basins analyzed found elevated concentrations of both metals and PAH's.

No process changes are required to install sedimentation of treated wood storage area storm water. A storm water collection system would be necessary and possibly a some method of providing flow equalization would be required prior to the sedimentation basin or clarifier. In many cases it may be possible to incorporate flow equalization into the collection system through the use of curbs or grading.

The cost of providing sedimentation for storm water runoff is dependent upon storm water volume and the characteristics of the solids to be removed. The storm water volume is directly related to the area of collection, rain fall intensity and duration. The solids characteristics that will have an impact on the cost of providing treatment are density and particle size.

Because of the variability between facilities both in collection area and in location, which in turn effects the amount of expected rain fall, the basis used to estimate collection and treatment costs is one acre of treated wood storage area. Annual rain fall is assumed to be 40 inches per year and the design storm is a 25 year, 24 hour rain fall event and is assumed to be 3.75 inches. A 25 year, 24 hour storm event is the most commonly used design storm in the BAT national effluent limitation guidelines that have been developed by EPA.

The costs of collecting and settling storm water runoff is directly proportional to the storm water collection area. The costs are also dependent upon the surface condition of the storage yard. Paved areas will generate larger runoff volumes for a given storm event than gravel or unpaved yards. An unpaved yard may have larger pollutant loadings due to past soils contamination.

For the purposes of this evaluation the following assumptions have been made:

- One acre collection area. Costs can be directly scaled up or down based upon actual collection area.
- The design storm is a 25 year 24 hour storm generating 3.75 inches of rain.
- A removal of 80% of all particles with a settling velocity of greater than 0.3 feet per hour.
- The entire collection area will need to be paved. Of the ten operating treating facilities in Washington, four facilities have paved or largely paved treated wood storage yards and two more are in the process, or planning to pave.
- The paved storage yard will be used to provide some flow equalization of storm water runoff from the larger storm events. This will enable the settling basin to be sized based upon a smaller peak runoff flow rate. The use of grading and/or curbs are two options for incorporating peak flow storage into the paving design.
- The installed cost for the collection system, including grading and paving is one dollar per square foot of collection area.
- The land costs for both the collection system and the settling basin are not included. The area required for the collection system is the entire treated wood storage area and incorporating storm water collection will have no effect on the production and will not restrict the use of the area. The area required for a settling basin is small, less than 5% of the total storm water collection area based upon no flow equalization in the storage yard. In most cases it is expected that the settling basin can be located in an unutilized area of the facility.

Based upon the above assumptions the cost of storm water collection and treatment by sedimentation is between 55,000 and 60,000 dollars per acre. Operation and maintenance for the system is estimated to be minimal and primarily related to the periodic removal and disposal of collected sediments. The costs of sediment disposal may become significant if they designate as hazardous wastes.

Non-water quality environmental impacts associated with the collection and sedimentation of storm water runoff are expected to be minimal.

To reduce the quantity of contaminated storm water generated and therefore costs, it is expected that facility operators will reduce the area used for treated wood storage as much as possible. This can be done by segregating treated and untreated wood, consolidating treated wood storage and by minimizing the amount of treated wood stockpiled.

The economic impact on individual facilities of requiring collection and treatment of treated wood storage area storm water can not be calculated due to the lack of facility specific financial data. The consideration of economic impact is included as part of both the federal and state technology based treatment requirements. Under the state statutes, economics are incorporated under reasonable term in AKART. The level of cost that is, or is not reasonable has not been generally defined under state law. Under the federal rules the costs of achieving the effluent reduction must be determined. Implicit in the Title; Best Available Technology Economically Achievable is the economic test, economic achievability.

The department believes that the permit terms and conditions which represent the application of BAT or AKART are reasonable and economically achievable by the majority of the industry in Washington State. In developing national effluent guidelines, EPA recognizes that many times the application of BAT on a national scale will result in the closure of marginal plants. The development of case-by-case BAT requirements for a specific facility is subject to economic achievability and presumably marginal plants would not be subject to closure. The department believes that BAT requirements for this industry as a

group need not be economically achievable by all facilities, to do so would set BAT for this industry at what is economically achievable for the most marginal facility in the state. This is not consistent with the intent of BAT which is that it represent treatment that is provided by the "best of the best".

For an individual facility it may be necessary to do a facility specific analysis to accurately determine the economic achievability of the effluent limitations and permit conditions in this permit. To do a site specific analysis it will be necessary to determine any site specific factors which will increase (or decrease) the estimated costs of compliance and modify the estimated costs as appropriate. It will also be necessary to obtain current financial information on the facility being permitted.

Table A1. TREATABILITY DATA (SEDIMENTATION)

	Median Effluent Concentration	Median Removal Efficiency (Percent)
Conventional Pollutants (mg/L);		
Total Suspended Solids	14	91
Oil and Grease	12	78
Chlorophenols (µg/L);		
2,4,6-Trichlorophenol	BDL	>68
2,3,4,6-Tetrachlorophenol	NO DATA	
Pentachlorophenol	12	>77
Polynuclear Aeromatic Hydrocarbons (µg/L);		
Naphthalene	12	>99
Acenaphthylene	10	>99
Acenaphthene	10	>99
Flourene	BDL	>99
Phenanthrene	11	0
Anthracene	5.2	36
Fluoranthene	BDL	>99
Pyrene	5.1	>88
Benzo(a)anthracene	12'	NM
Chrysene	13	>50
Benzo(b)fluoranthene	BDL	86'
Benzo(k)fluoranthene	BDL	>99'
Benzo(a)pyrene	BDL	99'
Dibenzo(a,h)anthracene	NO DATA	
Benzo(ghi)perylene	ND	>99
Indeno(1,2,3-cd)pyrene	NO DATA	
Metals (µg/L);		
Arsenic	<5	95
Cadmium	5.5	83
Chromium	25	95
Copper	50	93
Lead	40	89
Zinc	140	87

', Approximate Value
BDL, Below Detection
ND, Not Detected

Table A2. TREATABILITY DATA (FILTRATION)

	Median Effluent Concentration	Median Removal Efficiency (Percent)
Conventional Pollutants (mg/L);		
Total Suspended Solids	16	78
Oil and Grease	12	38
Chlorophenols (µg/L);		
2,4,6-Trichlorophenol	69	80
2,3,4,6-Tetrachlorophenol	NO DATA	
Pentachlorophenol	10	>99
Polynuclear Aeromatic Hydrocarbons (µg/L);		
Naphthalene	5.4	>91
Acenaphthylene	500	NM
Acenaphthene	0.6	>86
Flourene	5000	NM
Phenanthrene	<10	67
Anthracene	0.4	50
Fluoranthene	0.3	29
Pyrene	0.3	5
Benzo(a)anthracene	7300	NM
Chrysene	NO DATA	
Benzo(b)fluoranthene	NO DATA	
Benzo(k)fluoranthene	0.1	NM
Benzo(a)pyrene	0.5	NM
Dibenzo(a,h)anthracene	NO DATA	
Benzo(ghi)perylene	NO DATA	
Indeno(1,2,3-cd)pyrene	NO DATA	
Metals (µg/L);		
Arsenic	9.6	55
Cadmium	<2	>69
Chromium	30	31
Copper	30	43
Lead	50	62
Zinc	120	51

NM, Not Meaningful

Table A3. TREATABILITY DATA (CARBON ADSORPTION)

	Median Effluent Concentration	Median Removal Efficiency (Percent)
Conventional Pollutants (mg/L);		
Total Suspended Solids	54	96
Oil and Grease	14	47
Chlorophenols (µg/L);		
2,4,6-Trichlorophenol	NO DATA	
2,3,4,6-Tetrachlorophenol	NO DATA	
Pentachlorophenol	10	78
Polynuclear Aeromatic Hydrocarbons (µg/L);		
Naphthalene	5	98'
Acenaphthylene	NO DATA	
Acenaphthene	BDL	97'
Flourene	BDL	NM
Phenanthrene	BDL	98'
Anthracene	NO DATA	
Fluoranthene	BDL	92'
Pyrene	BDL	96'
Benzo(a)anthracene	BDL	95'
Chrysene	NO DATA	
Benzo(b)fluoranthene	NO DATA	
Benzo(k)fluoranthene	BDL	90'
Benzo(a)pyrene	0.8	NM
Dibenzo(a,h)anthracene	NO DATA	
Benzo(ghi)perylene	NO DATA	
Indeno(1,2,3-cd)pyrene	NO DATA	
Metals (µg/L);		
Arsenic	12	0
Cadmium	<2	86
Chromium	<20	40
Copper	<18	>64
Lead	<22	5
Zinc	69	64

', Approximate Value
BDL, Below Detection
NM, Not Meaningful

Table A4. CHEMICAL AND PHYSICAL PROPERTIES

	Solubility (mg/L)	Log octanol/water partition coefficient
Chlorophenols (µg/L):		
2,4,6-Trichlorophenol	800	3.38
2,3,4,6-Tetrachlorophenol		NO DATA
Pentachlorophenol	14	5.01
Polynuclear Aeromatic Hydrocarbons (µg/L):		
Naphthalene	34.4	3.37
Acenaphthylene	3.93	4.07
Acenaphthene	3.42	4.33
Flourene	1.98	4.18
Phenanthrene	1.29	4.46
Anthracene	0.073	4.45
Fluoranthene	0.26	5.33
Pyrene	0.14	5.32
Benzo(a)anthracene	0.014	5.61
Chrysene	0.002	5.61
Benzo(b)fluoranthene	0.0012	6.57
Benzo(k)fluoranthene	0.00055	6.84
Benzo(a)pyrene	0.0038	6.04
Dibenzo(a,h)anthracene	0.0005	5.97
Benzo(ghi)perylene	0.00026	7.23
Indeno(1,2,3-cd)pyrene	0.62	7.66

APPENDIX 2.

SELECTED STORM WATER EFFLUENT DATA

CHEMCO[1]

DATE	001	Arsenic	10 µg/l
		Copper	8 µg/l
		Chromium	24 µg/l
DATE	002	Arsenic	17 µg/l
		Copper	59 µg/l
		Chromium	180 µg/l

CASCADE POLE, TACOMA[2]

5/28/91	001	TSS	33 mg/l
		Arsenic	610 µg/l
		Copper	360 µg/l
		Lead	6 µg/l
		Chromium (T)	1100 µg/l
		Chromium (H)	1400 µg/l
		Zinc	60 µg/l
		Pentachlorophenol	270 µg/l
5/28/91	002	TSS	77 mg/l
		Arsenic	790 µg/l
		Copper	490 µg/l
		Lead	14 µg/l
		Chromium (T)	410 µg/l
		Chromium (H)	300 µg/l
		Zinc	260 µg/l
		Pentachlorophenol	27 µg/l
2/19/92	001	Arsenic	578 µg/l
		Chromium	403 µg/l
		Copper	371 µg/l
		Pentachlorophenol	48 µg/l

2/19/92	002 T	Arsenic	657 µg/l
		Chromium	475 µg/l
		Copper	780 µg/l
		Pentachlorophenol	21 µg/l
2/19/92	002 B	Arsenic	1860 µg/l
		Chromium	2140 µg/l
		Copper	2030 µg/l
		Pentachlorophenol	50 µg/l

PACIFIC WOOD TREATING CORPORATION[3]

10/30/86	001	TSS	220 mg/l
		Arsenic	249 µg/l
		Copper	421 µg/l
		Chromium	134 µg/l
		Pentachlorophenol	107 µg/l
		Total PAH's	256 µg/l
10/30/86	002	TSS	500 mg/l
		Arsenic	224 µg/l
		Copper	312 µg/l
		Chromium	235 µg/l
		Pentachlorophenol	22 µg/l
		Total PAH's	25 µg/l
10/30/86	003	TSS	220 mg/l
		Arsenic	57 µg/l
		Copper	127 µg/l
		Chromium	74 µg/l
		Pentachlorophenol	68 µg/l
		Total PAH's	85 µg/l
3/03/87	001	TSS	786 mg/l
		Arsenic	<200 µg/l
		Copper	164 µg/l
		Chromium	112 µg/l
		Pentachlorophenol	970 µg/l
		Total PAH's	2580 µg/l

3/03/87	002	TSS	3950 mg/l
		Arsenic	467 µg/l
		Copper	691 µg/l
		Chromium	754 µg/l
		Pentachlorophenol	190 µg/l
		Total PAH's	36 µg/l
3/03/87	003	TSS	1520 mg/l
		Arsenic	200 µg/l
		Copper	193 µg/l
		Chromium	136 µg/l
		Pentachlorophenol	210 µg/l
		Total PAH's	200 µg/l
11/24/87	001	TSS	1290 mg/l
		Arsenic	310 µg/l
		Copper	560 µg/l
		Chromium	260 µg/l
		Pentachlorophenol	750 µg/l
		Total PAH's	2500 µg/l
11/24/87	002	TSS	2380 mg/l
		Arsenic	330 µg/l
		Copper	480 µg/l
		Chromium	510 µg/l
		Pentachlorophenol	60 µg/l
		Total PAH's	52 µg/l
11/24/87	003	TSS	640 mg/l
		Arsenic	140 µg/l
		Copper	110 µg/l
		Chromium	70 µg/l
		Pentachlorophenol	230 µg/l
		Total PAH's	32 µg/l
11/24/87	004	TSS	660 mg/l
		Arsenic	126 µg/l
		Copper	237 µg/l
		Chromium	177 µg/l
		Pentachlorophenol	190 µg/l
		Total PAH's	89 µg/l

EXTERIOR WOOD INC.[4]

3/23/88	???	Arsenic	403 µg/l
		Chromium	1950 µg/l
		Copper	227 µg/l

EVERGREEN FOREST PRODUCTS INC. (ALLWEATHER)[5]

4/17/92	001	TSS	40 mg/l
		Arsenic	145 µg/l
4/17/92	002	TSS	23 mg/l
		Arsenic	70 µg/l
6/89-11/91	001	Copper:	
		Mean	353 µg/l
		Number	26
		Maximum	1300 µg/l
		Minimum	90 µg/l
		Std. Dev.	289 µg/l
		CV	.82
		Chromium:	
		Mean	1050 µg/l
		Number	26
		Maximum	4400 µg/l
		Minimum	140 µg/l
		Std. Dev.	1090 µg/l
		CV	1.03

6/89-11/91 002

Copper:

Mean	857 µg/l
Number	23
Maximum	8200 µg/l
Minimum	60 µg/l
Std. Dev.	1900 µg/l
CV	2.22

Chromium:

Mean	1456 µg/l
Number	21
Maximum	14000 µg/l
Minimum	90 µg/l
Std. Dev.	3340 µg/l
CV	2.30

NOTES:

1. Chemco data is from NPDES storm water permit application submitted on _____.

2. Cascade pole data is from the following sources:
   - 5/28/91 NPDES permit application signed that date.
   - 2/19/92 Ecology sample collected that date.

3. Pacific Wood Treating Corporation data is from Ecology Class II inspection report dated April 1989.

4. Exterior wood Inc. data is from a NPDES permit application signed on April 15, 1988 and submitted in 1992.

5. Evergreen Forest Products Inc. is from the following sources:
   - 4/17/92 NPDES permit application singed that date.
   - 6/89-11/91 Data is summarized from DMR submittals.